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WATER QUALITY SUMMARY
for the
INLAND LAKES of
GREY and BRUCE COUNTIES

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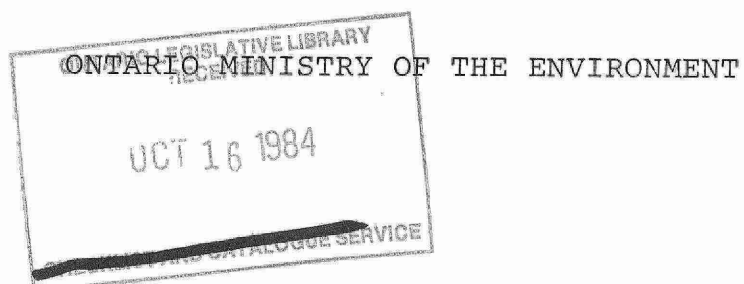
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Water Quality Summary for the
Inland Lakes of Grey and Bruce Counties

Water Resources Assessment Unit
Technical Support
Southwestern Region

January, 1983

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SUMMARY

The majority of inland lakes contained within the Southwestern Region of the Ministry of the Environment are found in Grey and Bruce counties. These lakes are small, shallow, hardwater lakes that are sensitive, primarily because of their size, to influences that affect their water quality. Little change has been noticed however in the productivity of these lakes as reflected through long-term monitoring of water clarity and phytoplankton from 1972 to 1981. Intermittently, however, their sensitivity has been demonstrated through peaks in phytoplankton growth which have resulted in documented blooms on twenty-five percent of the 28 lakes monitored. In addition, several lakes support extensive growths of rooted plants in the nearshore areas which have been a source of concern to users. Over the period of record, water quality has generally been good enough to support a variety of recreational uses.

INTRODUCTION

The monitoring of the inland lakes of Grey and Bruce counties began on a regular basis in 1972 with the sampling of two lakes. This quickly increased to eight lakes in 1973 and reached 13 lakes at the time of a 1977 publication^a. By 1981 the sampling program had increased to include 28 lakes on a regular basis (Table 1).

a "Enrichment Status of Owen Sound Bay, Tobermory Harbour and Thirteen Lakes in Grey and Bruce Counties 1975-1976." Ontario Ministry of the Environment.

Table 1. Inland lakes of Grey and Bruce counties monitored on a regular basis.

<u>No.</u>	<u>Name</u>	<u>Township, County</u>
1	Arran	Arran Township, Bruce County
2	Bass	Keppel Township, Grey County
3	Beattie	Albemarle Township, Bruce County
4	Bells	Glenelg Township, Grey County
5	Berford	Albemarle Township, Bruce County
6	Boat	Amabel Township, Bruce County
7	Brewster	Osprey Township, Grey County
8	Britain	Lindsay Township, Bruce County
9	Cameron	St. Edmunds Township, Bruce County
10	Chesley	Amabel Township, Bruce County
11	Cyprus	St. Edmunds Township, Bruce County
12	Eugenia	Artemesia Township, Grey County
13	Francis	Keppel Township, Grey County
14	Gillies	Lindsay Township, Bruce County
15	Gould	Amabel Township, Bruce County
16	Irish	Artemesia Township, Grey County
17	Isaac	Albemarle Township, Bruce County
18	McCullough	Sullivan Township, Grey County
19	McGill	Sydenham Township, Grey County
20	Miller	Lindsay Township, Bruce County
21	Mountain	Keppel Township, Grey County
22	Shephard	Keppel Township, Grey County
23	Shouldice	Lindsay Township, Bruce County
24	Silver	Amabel Township, Bruce County
25	Sky	Albemarle Township, Bruce County
26	Spry	Amabel Township, Bruce County
27	Wilcox	Artemesia Township, Grey County
28	Williams	Holland Township, Grey County

The main emphasis of the program was the monitoring of plant productivity in the lakes over time. Changes in water quality as reflected by changes in plant productivity signal the need for closer examination of a lake. Owing to a general uniformity of results indicating an absence of change in water quality over the ten year sampling period, the long-term monitoring program was temporarily stopped in 1981. It is the intention that lakes will be periodically re-sampled to see if the long-term trend is changing. In addition to the long-term monitoring, field investigations are conducted as the need arises, usually in response to a variety of water quality concerns. The program was conducted through the joint efforts of the North Grey-Sauble Valley Conservation Authorities and the Ontario Ministry of the Environment. The locations of the lakes are shown in Figure 1.

METHODS

The method used to document long-term water quality involved the surveillance of water clarity and plant (phytoplankton) productivity. Phytoplankton are free-floating microscopic plants (algae) that respond quickly to changes in water quality through changes in types and numbers. To collect phytoplankton it is first necessary to measure the depth of light penetration (water clarity) using a Secchi disc. The disc, having a diameter of 20 centimetres is divided into alternating black and white quadrants and is lowered into the water on a graduated line until the quadrants are no longer distinguishable. This depth is recorded and the disc is raised slowly until the quadrants are just distinguishable. This depth is also recorded and the average of the two readings is the Secchi disc depth (Figure 2). The depth to which light can penetrate in sufficient intensity to stimulate phytoplankton growth (the euphotic zone) is approximately twice the Secchi disc depth.

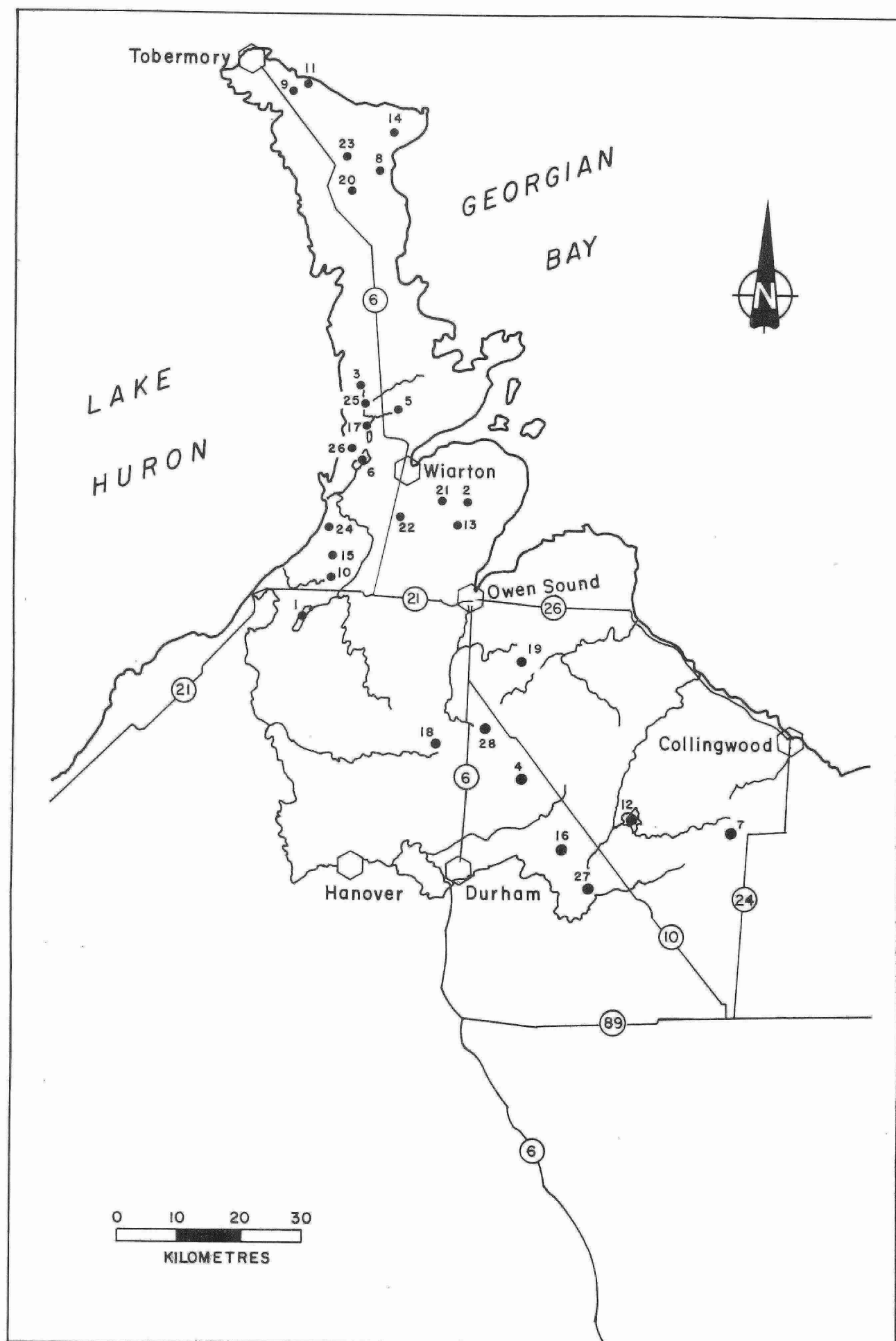


Figure 1. Locations of regularly monitored lakes.

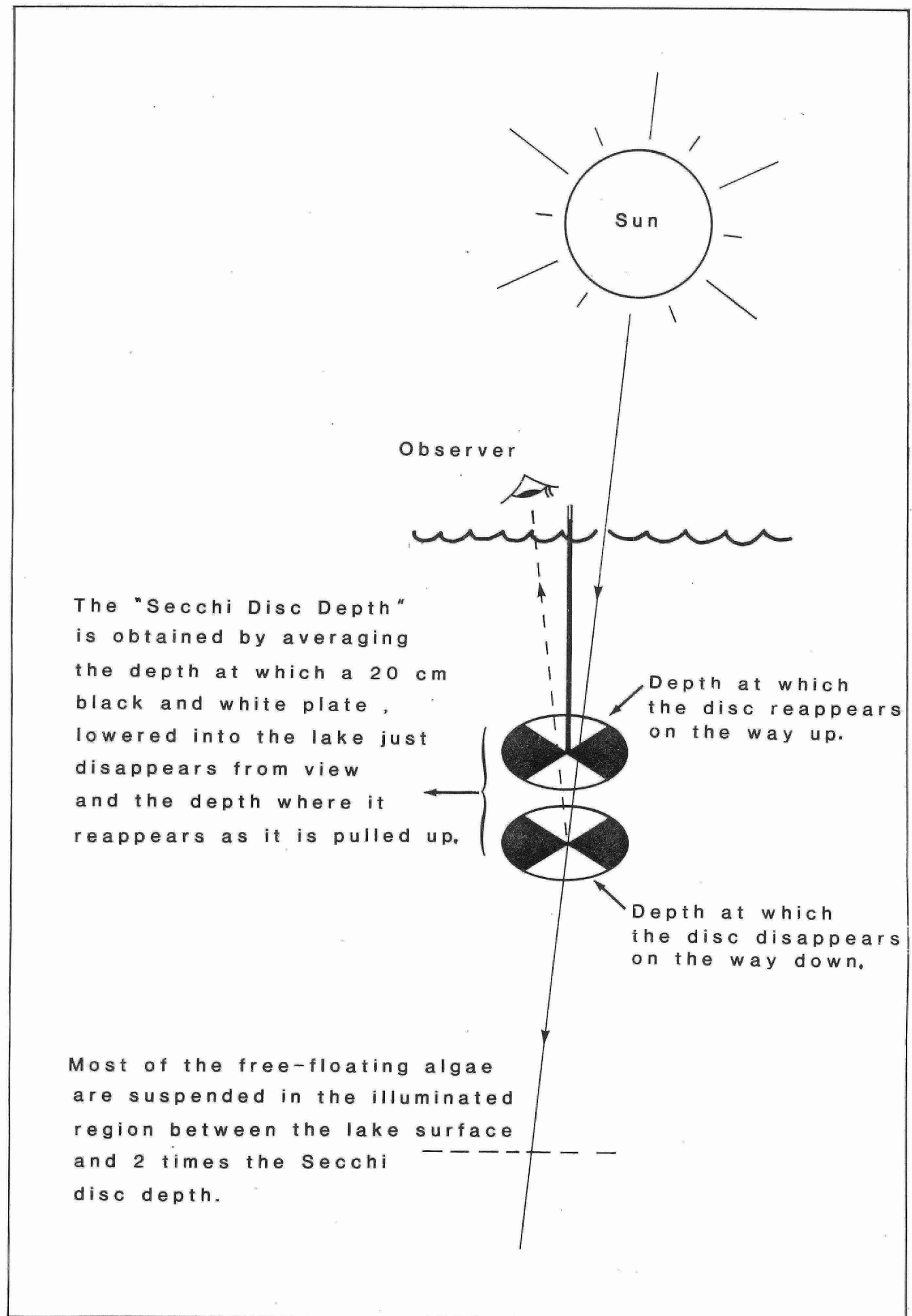


Figure 2. The use of a Secchi disc to measure water clarity.

Knowing the Secchi disc depth and consequently the depth to which algae can live (the euphotic zone), samples were collected through this zone. Samples collected for chlorophyll a analysis (1972 to 1981) were preserved with 1 ml of 0.5% magnesium carbonate while samples collected for phytoplankton analysis (1977 to 1981) were preserved with Lugols iodine (7 drops). All analyses were carried out at the Toronto laboratory of the Ministry of the Environment.

In addition to measuring water clarity and plant productivity, lake water chemistry was also analysed. Oxygen and temperature readings were obtained from just below the surface and from just off the bottom at the deepest spot in a lake using a Hach kit. If a lake contained more than one basin then oxygen and temperature were evaluated in each basin. If it was determined that thermal stratification was occurring then an oxygen-temperature profile was completed and a water sample was collected for chemical analysis from both the top and bottom waters. If a lake was homothermous then a single water sample was collected at mid-depth in the lake basin(s). Samples for chemical analysis were collected over the three-year period from 1977 to 1979 to establish baseline water chemistry.

All of the aforementioned samplings were conducted approximately every two weeks from May through August.

RESULTS AND CONCLUSIONS

Results for annual average chlorophyll a concentrations - Secchi disc depths and phytoplankton cell volumes are listed in tables 2 and 3 respectively. In addition, graphs displaying chlorophyll a - Secchi disc relationships, histograms displaying phytoplankton cell

TABLE 2. Annual average chlorophyll a - Secchi disc results for 1978 to 1981.

LAKE	1978		1979		1980		1981	
	Chl.a	Secchi	Chl.a	Secchi	Chl.a	Secchi	Chl.a	Secchi
	(ug/l)	depth (m)	(ug/l)	depth (m)	(ug/l)	depth (m)	(ug/l)	depth (m)
1) Arran	2.0	2.2	1.8	2.2	2.5	1.8	1.7	3.0
2) Bass	1.3	2.4	2.0	2.1	1.3	3.6	1.2	3.0
3) Beattie	1.6	1.7	1.1	1.5	1.4	1.5	2.4	2.0
4) Bells	1.3	4.1	1.9	3.5	1.9	3.1	1.6	3.3
5) Berford	1.7	3.5	2.0	3.3	1.5	4.4	1.7	3.0
6) Boat	1.7	2.0	1.9	1.8	2.2	1.5	2.1	1.7
7) Brewster	1.4	6.3	1.7	6.0	1.6	6.1	1.9	4.0
8) Britain	1.3	2.1	2.4	2.1	2.6	2.2	2.2	2.0
9) Cameron	1.2	3.1	1.8	2.1	1.2	3.3	1.4	2.3
10) Chesley	3.7	2.3	2.4	3.7	2.8	4.1	1.8	2.9
11) Cyprus	2.1	2.9	1.6	2.0	1.4	2.4	1.3	2.1
12) Eugenia	2.6	4.0	2.3	3.4	2.6	4.2	2.6	3.0
13) Francis	0.5	2.4	1.2	2.6	1.4	3.3	1.5	2.4
14) Gillies	0.9	5.6	1.0	4.6	1.0	6.9	0.9	5.4
15) Gould	2.4	3.5	2.8	2.7	2.3	3.4	2.2	2.7
16) Irish	--	--	1.5	3.4	2.6	4.9	2.5	2.9
17) Issac	1.7	1.6	1.4	1.5	1.8	1.2	2.1	1.7
18) McCullough	1.3	4.0	1.8	3.6	1.5	4.4	1.7	3.6
19) McGill	--	--	2.7	2.1	3.7	3.1	2.6	2.4
20) Miller	2.3	2.9	2.5	1.8	2.1	2.7	2.0	2.4
21) Mountain	1.3	1.7	1.9	1.7	2.5	1.6	1.5	1.7
22) Shephard	--	--	0.7	4.8	1.6	1.4	2.1	1.6
23) Shouldice	0.9	2.2	3.7	1.7	1.0	2.0	1.1	2.3
24) Silver	1.1	1.7	1.9	1.5	1.5	1.2	1.3	1.6
25) Sky	1.8	1.6	1.8	1.7	1.8	1.7	1.5	1.5
26) Spry	2.5	1.8	2.8	2.4	2.2	2.1	1.7	1.9
27) Wilcox	2.9	4.0	2.5	2.9	3.1	3.6	3.2	2.3
28) Williams	--	--	1.1	1.9	0.7	3.8	0.6	3.0

TABLE 3. Annual average phytoplankton results for 1977 to 1981.

LAKE	CELL VOLUME mm ³ /l				
	1977	1978	1979	1980	1981
1) Arran	.708	1.293	1.003	1.080	.375
2) Bass	.299	.809	.367	.958	.037
3) Beattie	.790	.679	.332	.589	.434
4) Bells	--	.690	.476	.509	.240
5) Berford	.950	.927	.850	.518	.739
6) Boat	.178	1.455	.794	.530	.433
7) Brewster	--	.478	.661	.680	.447
8) Britain	--	--	.675	.944	.327
9) Cameron	.495	.604	.880	.640	.408
10) Chesley	.612	1.976	.675	.772	.239
11) Cyprus	.550	1.207	.667	.997	.121
12) Eugenia	.227	.827	.934	1.905	.363
13) Francis	--	.458	.427	1.491	.269
14) Gillies	.216	.465	.202	.308	.114
15) Gould	.391	1.368	1.405	1.258	.483
16) Irish	.631	--	.381	.753	.522
17) Issac	.309	.574	.230	.219	.094
18) McCullough	.501	.487	.542	.390	.250
19) McGill	--	--	.378	.897	.178
20) Miller	.592	4.153	1.066	2.276	.569
21) Mountain	--	2.471	.567	1.062	.390
22) Shephard	--	--	--	1.099	.257
23) Shouldice	.681	.681	1.687	.376	.189
24) Silver	.265	.632	.725	.419	.107
25) Sky	.285	.459	.519	.586	.136
26) Spry	.620	.939	.695	1.194	.329
27) Wilcox	--	1.073	1.120	1.436	.296
28) Williams	.075	.226	.140	.171	.085

volumes and tables showing water chemistry are summarized for each of the 28 lakes in the Appendix. Chlorophyll a data for 1977 has been deleted because of analytical uncertainty.

The chlorophyll a - Secchi disc curves indicate that the lakes were relatively unproductive with regard to phytoplankton. To illustrate this, data points are individually displayed for each lake in relation to a curve which was derived from data collected from more productive lakes in the Kawartha Lakes district. The majority of lakes in Grey and Bruce counties had an annual average chlorophyll a concentration between 1 and 2.5 ug/l. Britain, Eugenia, Gould, Irish, and Spry lakes had annual averages which ranged as high as 2.6 to 3 ug/l, while Chesley, McGill, Shouldice and Wilcox lakes had averages between 3 and 4 ug/l.

Similarly, the phytoplankton cell volumes were also very low. As a general rule, the following categories may be applied to interpret phytoplankton cell volumes.

<u>Cell Volume</u> (mm ³ /l)	<u>Degree of Productivity</u>
L1	low
1-3	moderate
G3	high

L = Less Than

G = Greater Than

During 1977 and 1981, no lake exceeded an average annual cell volume of 1 mm³/l, thus indicating years of moderate productivity. For the years from 1978 to 1980, Arran, Gould Miller and Wilcox lakes had volumes consistently above 1 mm³/l. Sixteen of the remaining 24 lakes remained less than 1 mm³/l and the other 8 had yearly

fluctuations above $1 \text{ mm}^3/\text{l}$, indicating years of moderate productivity. Miller lake was the only lake that had a high degree of productivity ($4.153 \text{ mm}^3/\text{l}$) which occurred during the summer of 1978.

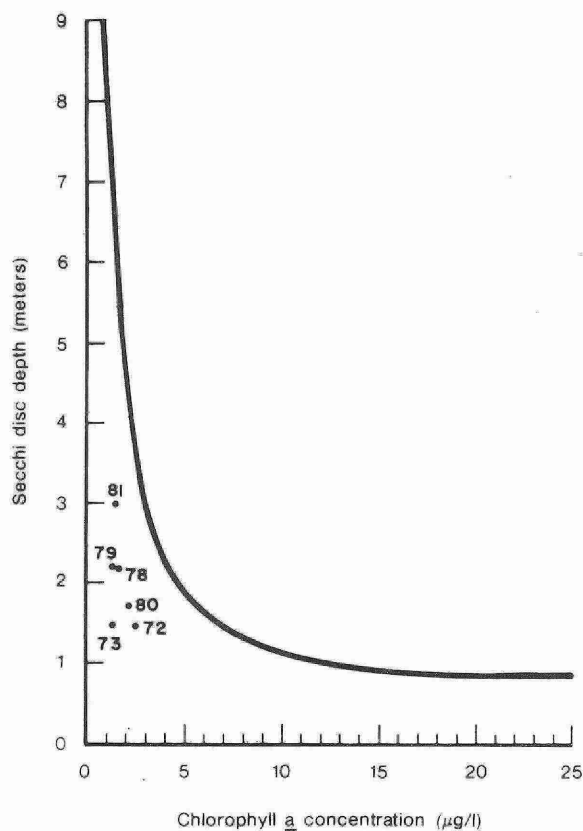
Despite low annual averages, which reflect a generally acceptable level of productivity, peaks in productivity called "blooms" can occur. Known blooms have occurred in Berford, Chesley, Bass, Eugenia, Gould, Miller and Wilcox lakes.

Because of the physical nature of the lakes, much of the plant productivity is in plant forms other than phytoplankton. Typically these other types of plants are rooted plants, diatom scums and/or beds of the alga, Chara. Heavy growths of rooted plants in the nearshore areas have been a source of particular concern to users of Eugenia, Wilcox and Chesley lakes.

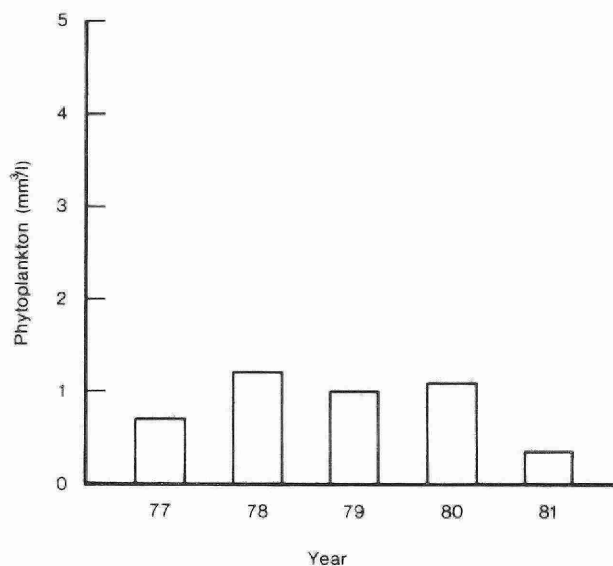
The water chemistry data show the lakes to be hardwater lakes with high alkalinities, which reflects their location in the calcareous bedrock of the Niagara Escarpment. Most of the hardness is in the form of calcium carbonate which encrusts the aquatic plants and deposits on the bottom as marl. In general, the hardness ranges between 100 and 200 mg/l (as CaCO_3). Several lakes, Bass, Bells, Eugenia, McCullough, Shephard and Williams, have a hardness in excess of 200 mg/l . Phosphorus concentrations were generally quite low over the period of measurement from May through August. Enough phosphorus is present however to support aquatic plant growth and along with ammonia showed a tendency in some stratified lakes to be higher in bottom waters. An increase of ammonia and phosphorus can be indicative of deteriorating water quality however no obvious relationship was demonstrated for these lakes.

APPENDIX

1. ARRAN LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

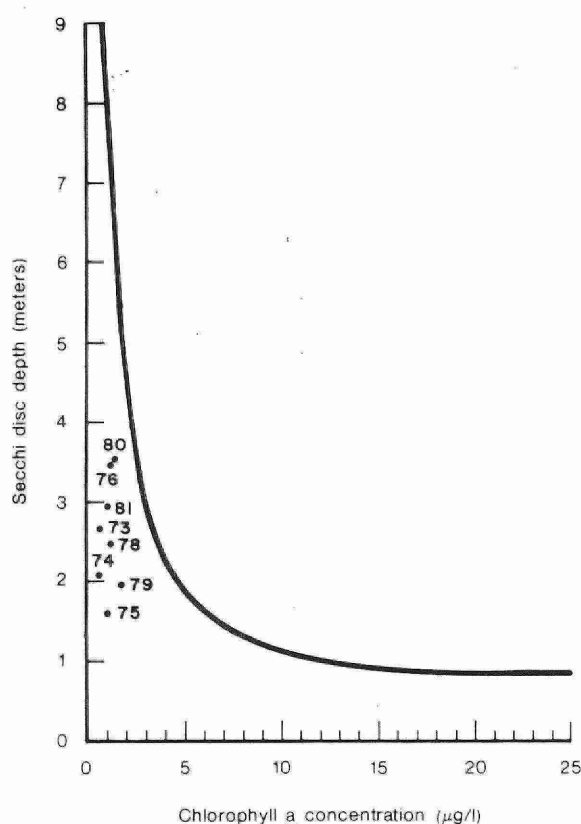
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (µg/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977	0.8	--	0.708	0.014	0.003	3.9	140
1978	2.2	2.0	1.293	0.015	0.004	4.0	151
1979	2.2	1.8	1.003	0.011	0.002	4.2	139
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	0.039	0.552	0.003	0.02	8.45	--	--
1978	0.039	0.528	0.002	<0.01	8.45	178	2.7
1979	0.033	0.510	0.001	<0.01	8.50	162	5.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	113	--	0.052	--	--	--	
1978	147	1.02	0.05	38.5	2.2	14.0	
1979	126	--	0.11	31.5	2.3	14.7	

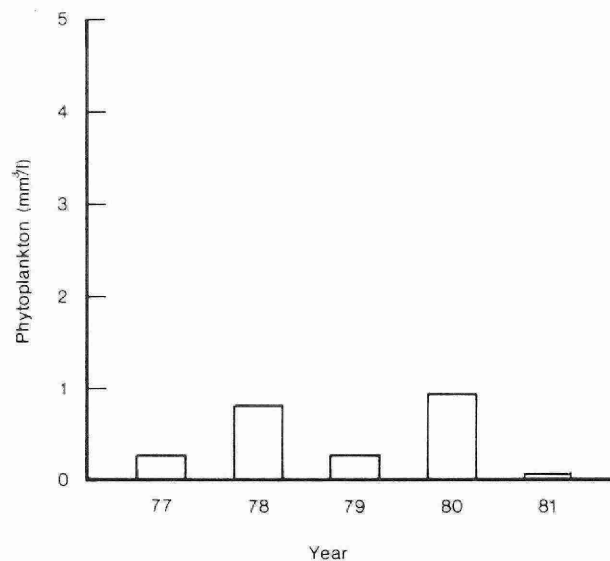
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

2. BASS LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

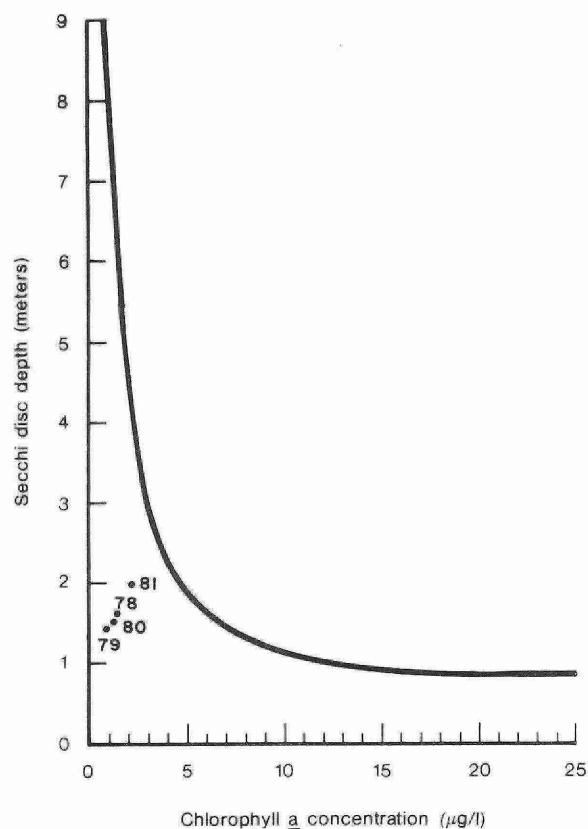
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	3.4	--	0.299	0.007	0.001	2.86	188.3
B				0.084	0.006	9.27	238.5
1978 T	2.4	1.5	0.809	0.010	0.002	2.6	205
B				0.062	0.004	4.0	197
1979 T	2.1	2.0	0.367	0.007	0.001	3.1	178
B				0.041	0.009	3.8	208
Nitrogens				pH		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977 T	0.015	0.4168	0.002	0.021	8.37	--	--
B	1.52	2.37	0.006	0.019	7.55		
1978 T	0.02	0.29	0.75	0.43	8.29	204	1.0
B	0.468	1.09	0.006	0.28	7.92		
1979 T	0.011	0.25	0.002	0.07	8.48	202	5.0
B	0.615	1.1	0.007	0.08	7.77	234	6.6
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	174.3		0.028				
B	235.2	--	0.175	--	--		
1978 T	193	2.73	0.034	42.5	1.3	23.9	
B	194	3.17	0.24	42.8	2.5	20.0	
1979 T	170		0.03	34.8	1.6	24.4	
B	200	--	0.12	45.7	1.8	24.9	

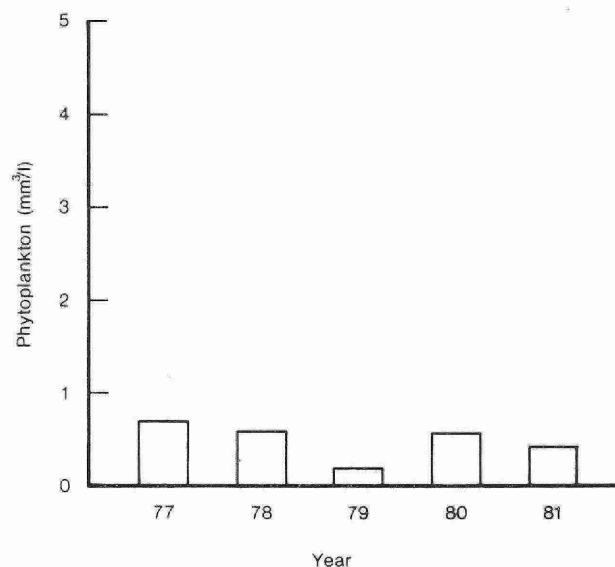
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

3. BEATTIE LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

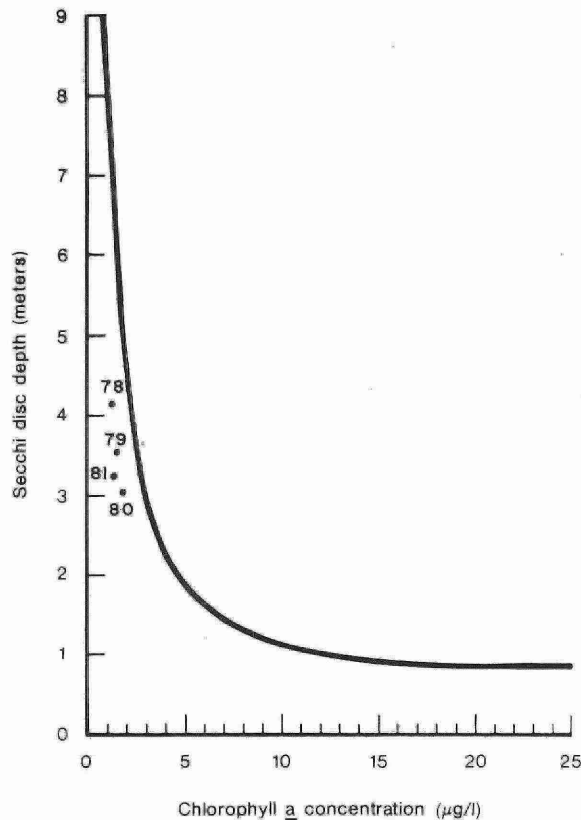
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977	--	--	0.780	--	--	--	--
1978	1.7	1.6	0.679	0.012	0.003	1.6	151
1979	1.5	1.1	0.332	0.016	0.001	2.3	145
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	--	--	--	--	--	--	--
1978	0.033	0.538	0.003	0.015	--	167	3.5
1979	0.034	0.52	0.001	0.03	8.58	167	< 5.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	--	--	--	--	--	--	--
1978	--	0.7	0.04	33.8	0.73	17.2	
1979	127	--	0.08	26.8	0.7	19.0	

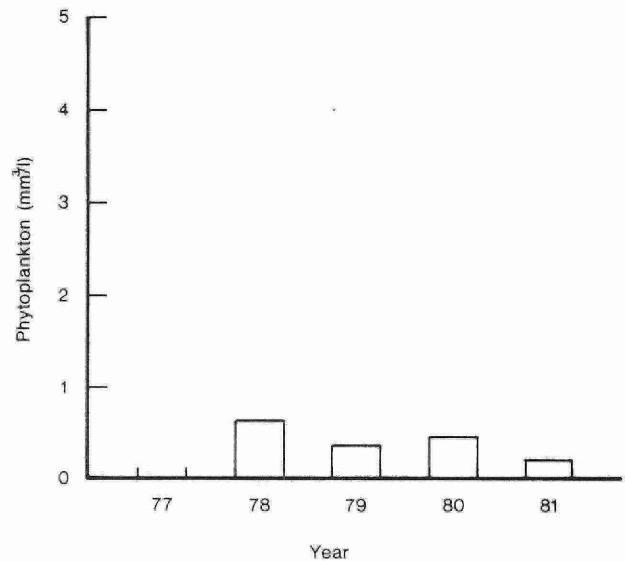
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

4. BELLS LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	4.1	1.4	0.690	0.004	0.001	5.2	213
B	--	--	--	0.007	0.001	4.6	216
1979 T	3.5	2.0	0.476	0.010	0.002	6.0	215
B	--	--	--	0.012	0.003	5.2	219

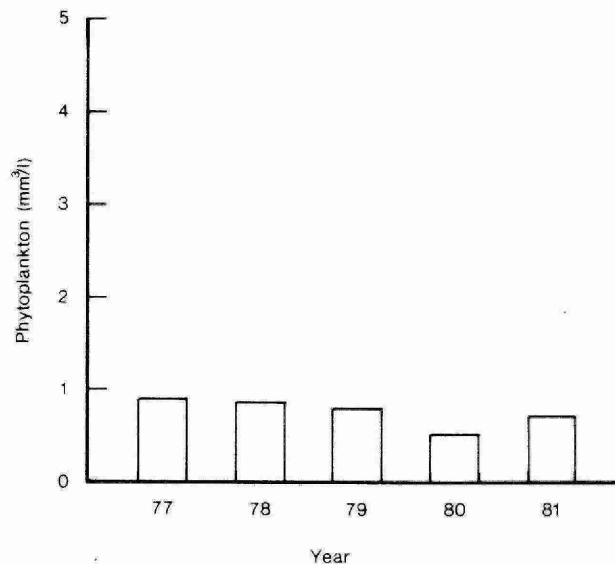
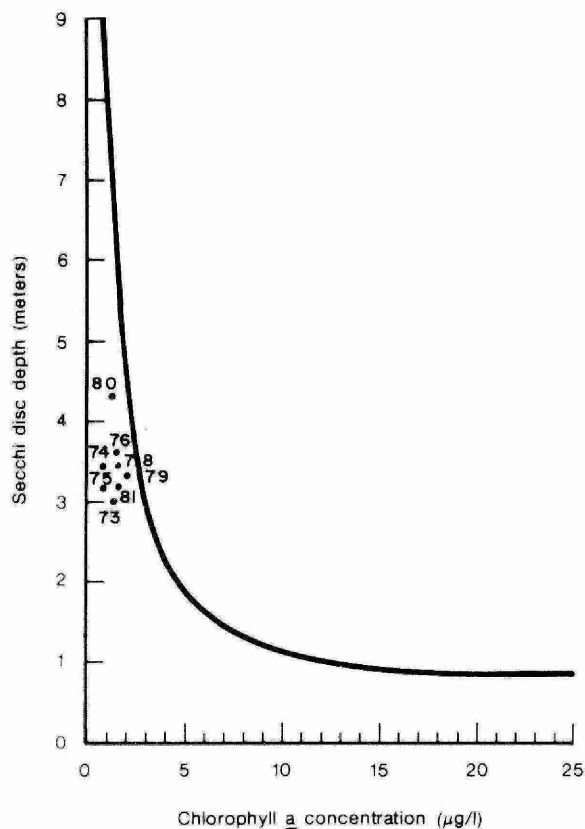
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	0.038	0.353	0.004	0.008	8.32	214	2.1
B	0.046	0.388	0.004	0.009	8.25	214	2.1
1979 T	0.024	0.37	0.002	0.03	8.38	246	<5.0
B	0.119	0.44	0.002	0.04	8.05	241	<5.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	--	--	--	--	--	--
B	--	--	--	--	--	--
1978 T	205	0.66	0.04	46.8	2.9	23.2
B	203	0.72	0.05	48.1	2.8	23.1
1979 T	199	--	0.07	44.4	3.5	25.3
B	202	--	0.05	46.5	3.1	24.9

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

5. BERFORD LAKE



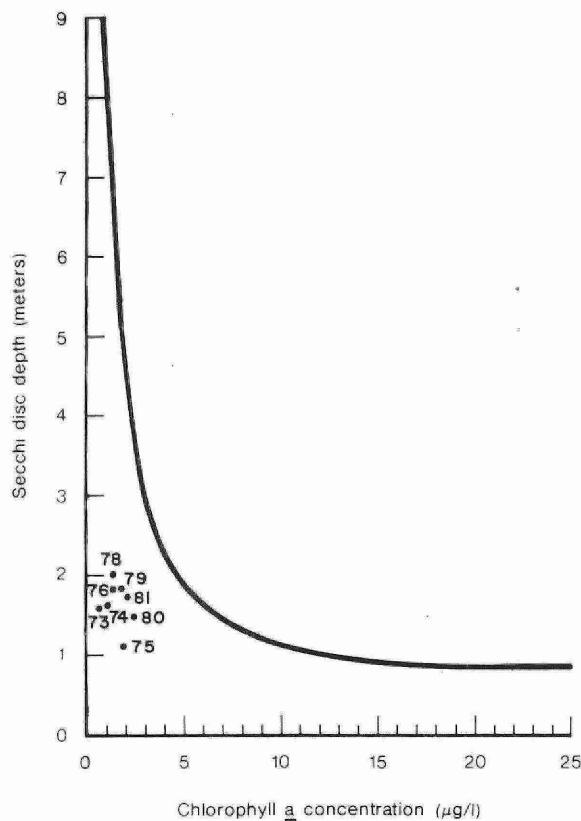
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	3.7	--	0.950	0.010	0.002	2.39	141.8
B				0.010	0.002	2.36	143.6
1978 T	3.5	1.7	0.927	0.005	0.002	2.3	164.3
B				0.006	0.002	2.3	164.3
1979 T	3.3	2.0	0.850	0.010	0.001	2.3	143
B				0.009	0.001	2.2	144
Nitrogens				pH		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977 T	0.036	0.567	0.001	0.013	8.49	--	--
B	0.036	0.615	0.001	0.011	8.52		
1978 T	0.04	0.494	0.002	0.02	8.39	153	0.5
B	0.04	0.511	0.002	0.02	8.41	159	0.5
1979 T	0.022	0.464	0.001	< 0.01	8.60	169	< 5.0
B	0.027	0.484	0.001	< 0.01	8.61	170	< 5.0
Alkalinity as CaCO ₃		Turbidity FTU**		Iron	Calcium	Sodium	Magnesium
Year							
1977 T	123.5	--		0.036	--	--	--
B	123.7			0.063			
1978 T	158	0.90		0.06	38.0	0.8	16.8
B	156	1.30		0.05	38.0	0.8	16.8
1979 T	129	--		0.03	28.7	0.9	17.4
B	129			0.03	28.8	0.9	17.5

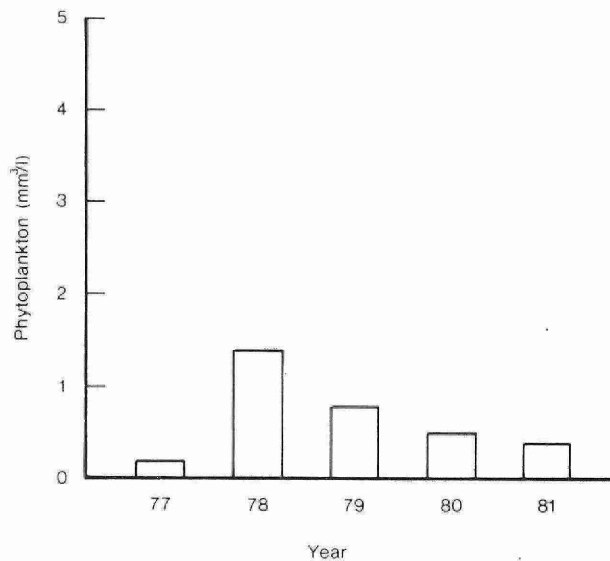
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

6. BOAT LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

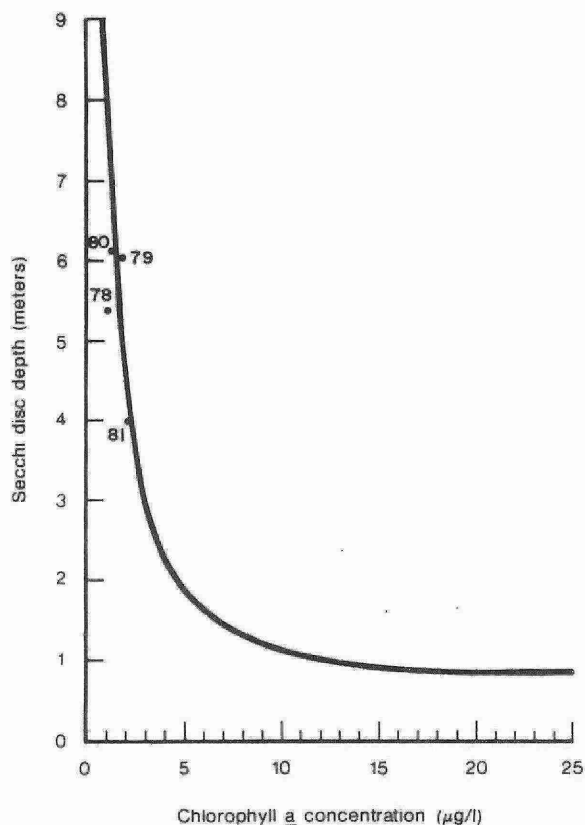
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (µg/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977	1.1	--	0.178	0.012	0.002	3.75	155.3
1978	2.0	1.7	1.455	0.009	0.002	1.5	164
1979	1.8	1.9	0.794	0.017	0.001	4.3	174
Year	Nitrogens				pH	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	0.021	0.473	0.003	0.01	8.47	--	--
1978	0.029	0.489	0.001	0.01	8.29	394	3.8
1979	0.028	0.53	0.001	< 0.01	8.48	199	< 5.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	146.5	--	0.058	--	--	--	
1978	155	0.95	0.08	39.0	1.6	16.1	
1979	158	--	0.06	37.2	2.1	19.6	

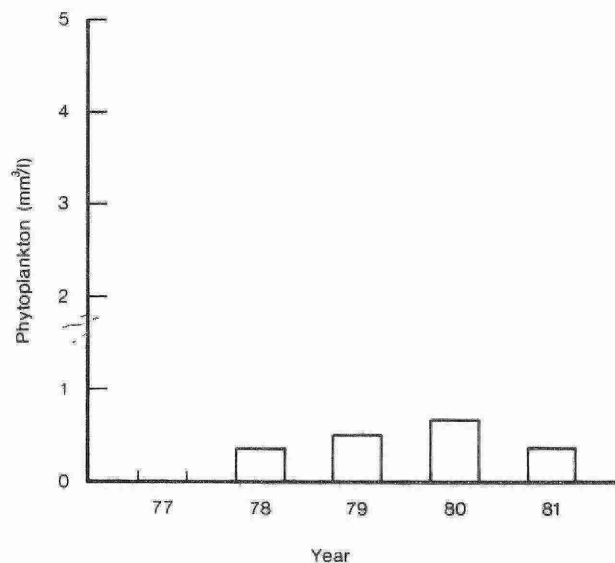
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

7. BREWSTER LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

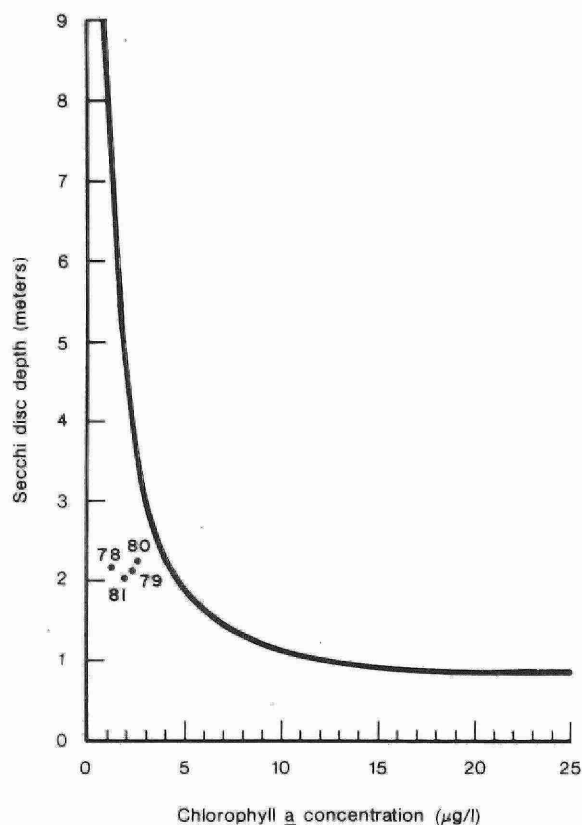
Average values for water quality parameters

Average values for 1977		Average values for 1978		Average values for 1979		Average values for 1980	
Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	5.4	1.2	0.478	0.006	0.002	2.3	152
B	--	--	--	0.008	0.001	2.1	151
1979 T	6.0	1.6	0.661	0.007	0.002	2.9	185
B	--	--	--	0.010	0.001	2.5	197
Nitrogens				pH		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	0.063	0.374	0.048	0.29	8.35	159	2.0
B	0.119	0.444	0.049	0.26	8.39	180	2.0
1979 T	0.059	0.437	0.007	0.14	8.45	194	<5.0
B	0.332	0.658	0.010	0.08	7.98	171	<5.0
Alkalinity		Turbidity					
Year	as CaCO ₃	FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	--	--	--	--	--	--	
B	--	--	--	--	--	--	
1978 T	136	0.52	0.04	36	0.9	15.0	
B	137	0.77	0.06	35	0.9	15.3	
1979 T	143	--	0.02	44.6	1.1	17.7	
B	148	--	0.07	48.4	1.0	18.3	

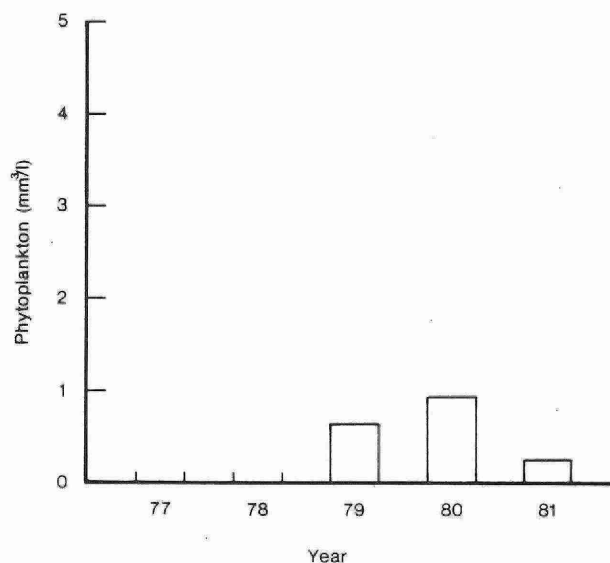
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

8. BRITAIN LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

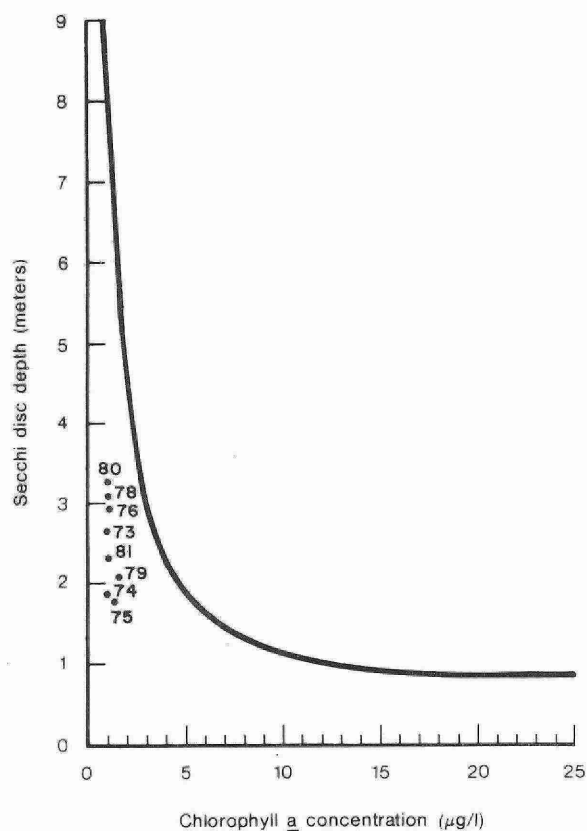
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977	--	--	--	--	--	--	--
1978	2.1	1.3	--	0.010	0.001	1.0	10
1979	2.1	2.4	0.675	0.010	0.002	1.0	139
Year	Free ammonia	Nitrogens			pH (no units)	Solids	
		Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	--	--	--	--	--	--	--
1978	0.045	0.39	0.001	< 0.01	9.2	--	--
1979	0.035	0.46	0.001	0.01	8.46	157	< 5.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	--	--	--	--	--	--	
1978	8.0	1.1	0.05	--	--	--	
1979	124	--	0.08	30.6	0.4	15.3	

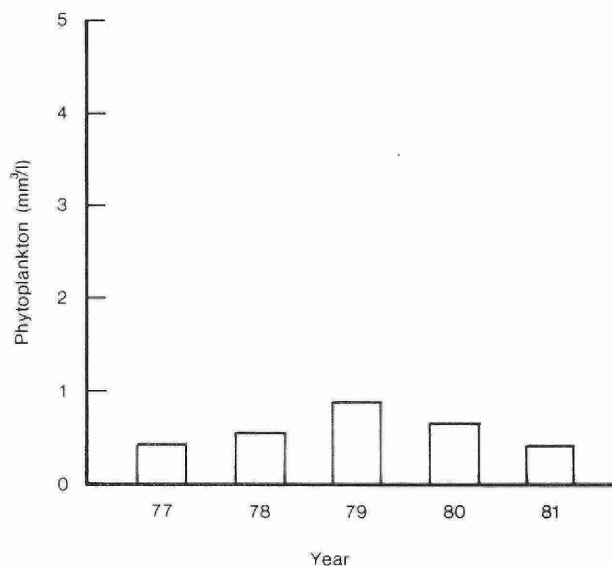
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

9. CAMERON LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

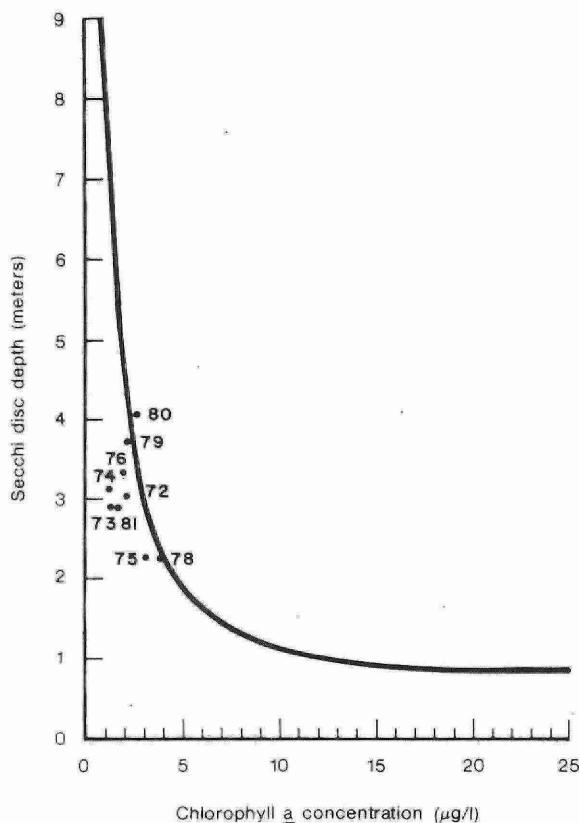
Average values for water quality parameters

Year		Secchi	Chlorophyll	Phytoplankton	Phosphorus		Chloride	Hardness
		disc (m)	a (ug/l)	volume (mm³/l)	Total	Soluble	as Cl	as CaCO ₃
1977	T				0.007	0.002	1.4	178.6
	B	2.5	--	0.495	0.015	0.002	1.2	181.1
1978	T				0.007	0.001	1.6	212
	B	3.1	1.2	0.604	0.016	0.002	1.5	188
1979	T				0.006	0.001	1.8	187
	B	2.1	1.8	0.880	0.007	0.002	1.8	187
Year		Nitrogens				pH	Solids	
		Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	T	0.019	0.402	0.002	0.076	8.39	--	--
	B	0.122	0.593	0.002	0.086	8.11	--	--
1978	T	0.017	0.303	0.003	0.03	8.61	214	2.5
	B	0.071	0.475	0.005	0.05	8.62		
1979	T	0.014	0.30	0.001	0.013	8.45	207	5.0
	B	0.068	0.39	0.002	0.016	8.26	205	5.0
Year		Alkalinity	Turbidity		Iron	Calcium	Sodium	Magnesium
		as CaCO ₃	FTU**					
1977	T	161.6			0.039			
	B	166.4	--		0.121	--	--	--
1978	T	165	1.5		0.15	49.6	9.6	19.1
	B	166	4.0		0.07	40.0	0.5	21.7
1979	T	167			0.04	39.0	0.6	21.8
	B	168	--		0.08	39.5	0.7	21.3

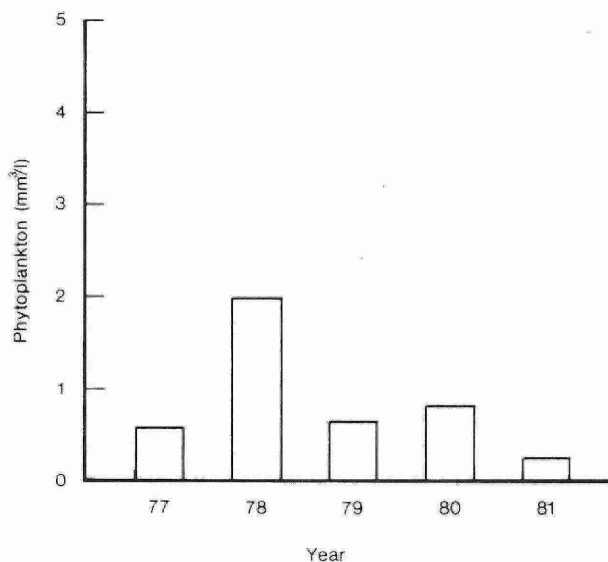
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

10. CHESLEY LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

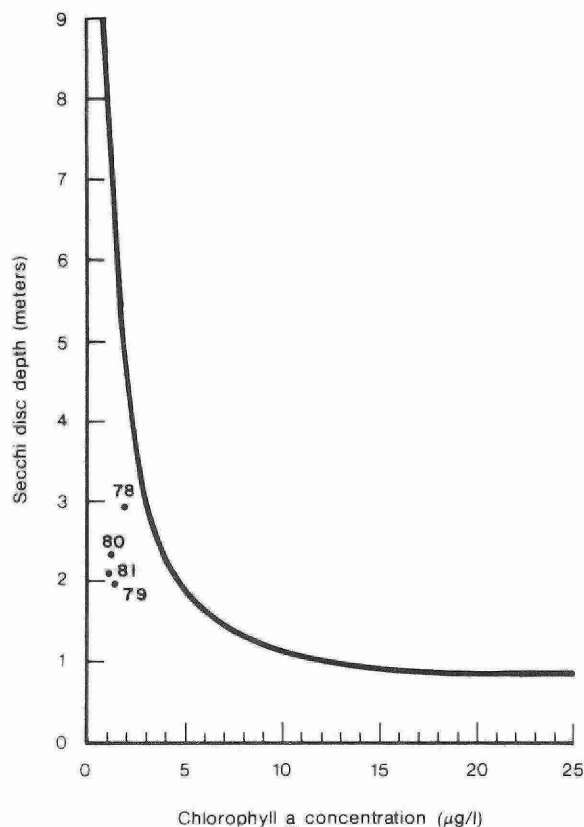
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977 T	3.4	--	0.612	0.013	0.002	6.02	135.1
B				0.038	0.006	6.06	151.7
1978 T	2.3	3.7	1.976	0.016	0.004	5.3	150.6
B				0.033	0.04	5.3	152.8
1979 T	3.7	2.4	0.675	0.012	0.003	5.3	144
B				0.055	0.014	5.4	161
Nitrogens				pH (no units)		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.016	0.469	0.001	0.021	8.37	--	--
B	0.353	0.818	0.003	0.026	7.61		
1978 T	0.016	0.75	0.001	< 0.01	8.50	180	2.25
B	0.129	0.656	0.002	< 0.01	8.48	186	2.25
1979 T	0.024	0.38	0.001	0.01	8.27	169	< 5.0
B	0.369	0.76	0.002	0.01	7.57	192	4.9
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	119.2		0.033				
B	139.7	--	0.575	--	--		
1978 T	143	1.1	0.07	37.0	2.7	14.1	
B	142	3.0	0.18	38.2	2.7	13.9	
1979 T	126		0.03	35.1	2.8	14.5	
B	147	--	0.62	40.5	2.8	14.5	

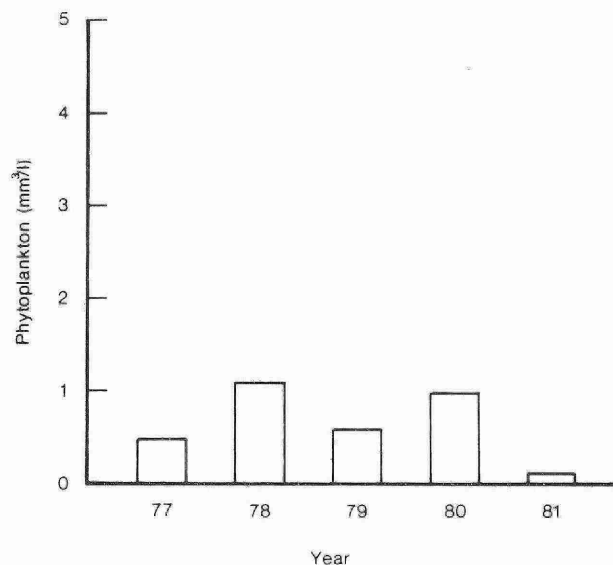
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

11. CYPRUS LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Average values for water quality parameters							
Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	2.8	--	0.550	0.008	0.002	2.0	173.3
B				0.018	0.002	2.13	172.0
1978 T	2.9	2.1	1.207	0.005	0.002	2.1	174
B				0.006	0.002	2.2	183
1979 T	2.0	1.6	0.667	0.006	0.002	2.2	182
B				0.011	0.002	2.2	183

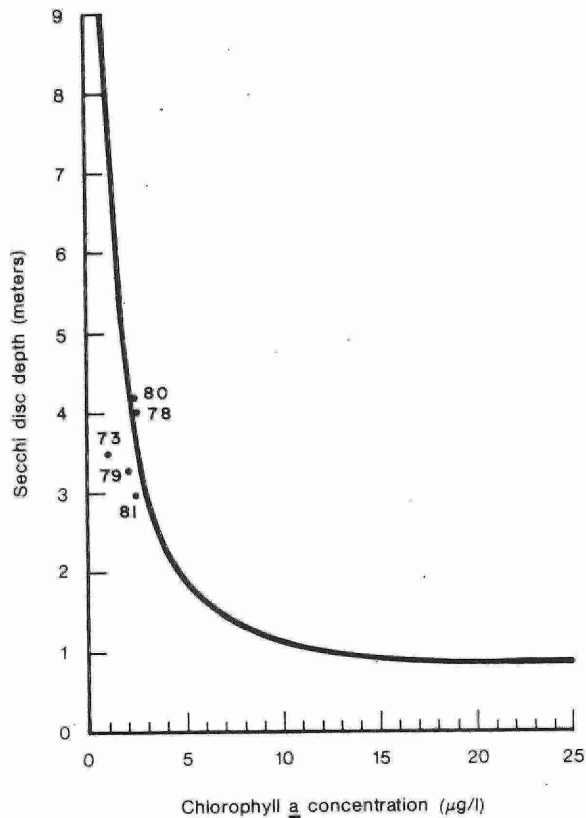
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.02	0.423	0.002	0.045	8.32	--	--
B	0.024	0.543	0.002	0.045	8.29		
1978 T	0.015	0.319	0.003	0.04	8.27	219	4.6
B	0.015	0.335	0.002	0.04	8.60		
1979 T	0.024	0.34	0.002	0.01	8.47	196	<5.0
B	0.039	0.36	0.001	0.02	8.35	191	<5.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	154.3		0.04			
B	159	--	0.10	--	--	--
1978 T	163	2.13	0.03	39.5	0.4	19.2
B	162	2.13	0.03	39.8	0.5	18.4
1979 T	161		0.04	38.1	0.8	21.1
B	163	--	0.05	38.4	0.7	21.1

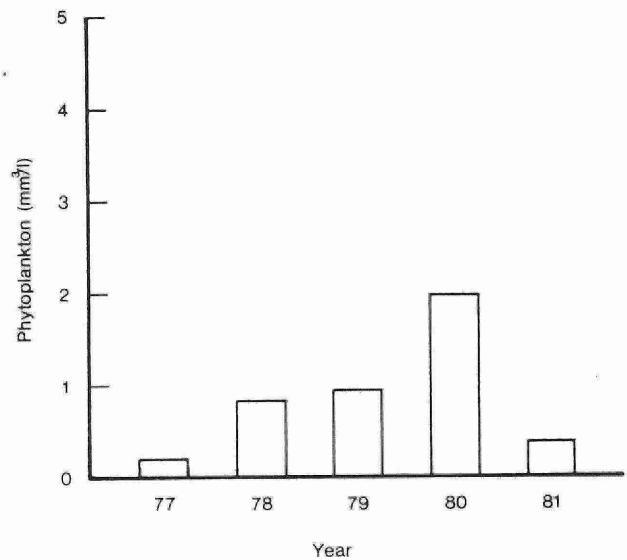
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

12. EUGENIA LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977 T	3.9	--	0.227	0.009	0.003	3.5	212
B				0.014	0.005	3.5	200
1978 T	4.0	2.6	0.827	0.01	0.002	3.9	210
B				0.015	0.002	3.7	212
1979 T	3.4	2.3	0.934	0.008	0.001	3.9	198
B				0.026	0.004	3.9	231

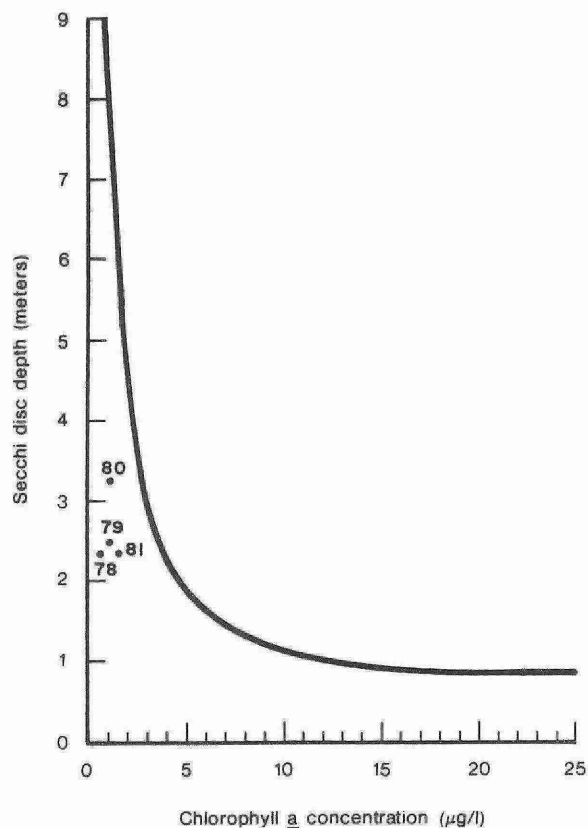
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.005	0.300	0.007	0.84	8.36	--	--
B	0.025	0.455	0.005	0.86	8.21	--	--
1978 T	0.028	0.391	0.005	0.4	8.53	223	2.0
B	0.032	0.429	0.005	0.4	8.49	223	2.0
1979 T	0.033	0.37	0.003	0.21	8.37	224	< 5.0
B	0.577	1.02	0.005	0.20	7.74	270	6.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	187	--	0.04	--	--	--
B	186		0.08			
1978 T	195	0.76	0.062	49.8	1.9	20.6
B	196	1.32	0.122	50.0	1.8	20.6
1979 T	185	--	0.12	40.4	2.3	23.6
B	227		0.53	52.8	2.4	24.2

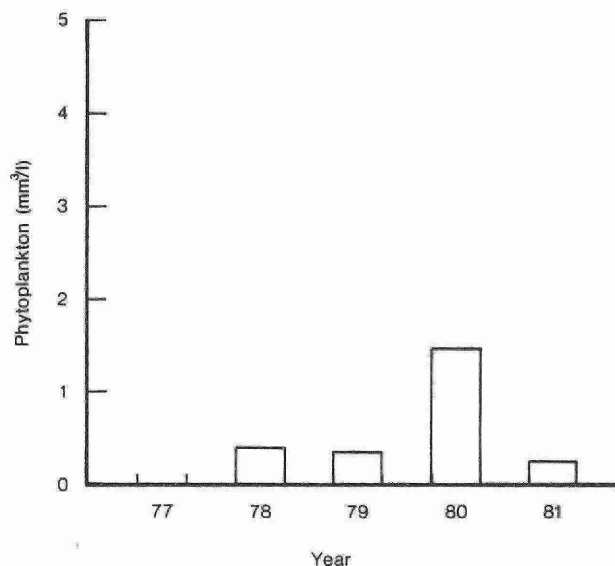
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

13. FRANCIS LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

	Secchi	Chlorophyll	Phytoplankton	Phosphorus		Chloride	Hardness
Year	disc (m)	a (ug/l)	volume (mm ³ /l)	Total	Soluble	as Cl	as CaCO ₃
1977	--	--	--	--	--	--	--
1978	2.9	0.95	0.458	0.008	0.002	2.0	184
1979	2.6	1.2	0.427	0.010	0.001	2.3	164

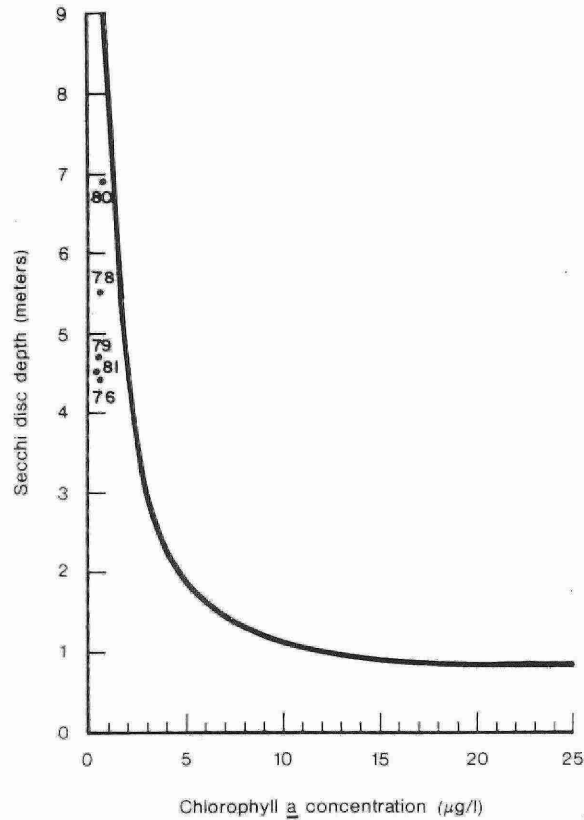
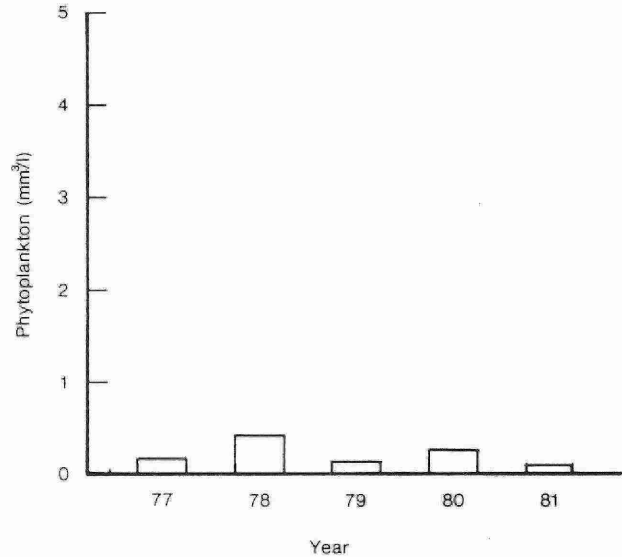
	Nitrogens				pH	Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	--	--	--	--	--	--	--
1978	0.028	0.358	0.005	0.362	8.45	216	3.5
1979	0.031	0.38	0.001	0.03	8.62	205	<5.0

	Alkalinity	Turbidity				
Year	as CaCO ₃	FTU**	Iron	Calcium	Sodium	Magnesium
1977	--	--	--	--	--	--
1978	184	0.75	0.025	42.5	0.9	21.6
1979	143	--	0.07	25.1	1.0	22.6

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

14. GILLIES LAKE

Chlorophyll a-Secchi disc curve.

Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977 T	7.5	--	0.216	0.015	--	1.0	169
B				0.007	--	1.0	168
1978 T	5.6	0.9	0.465	0.004	0.001	0.7	162
B				0.009	0.001	0.7	176
1979 T	4.6	1.0	0.202	0.004	0.002	0.7	166
B				0.008	0.002	0.8	179

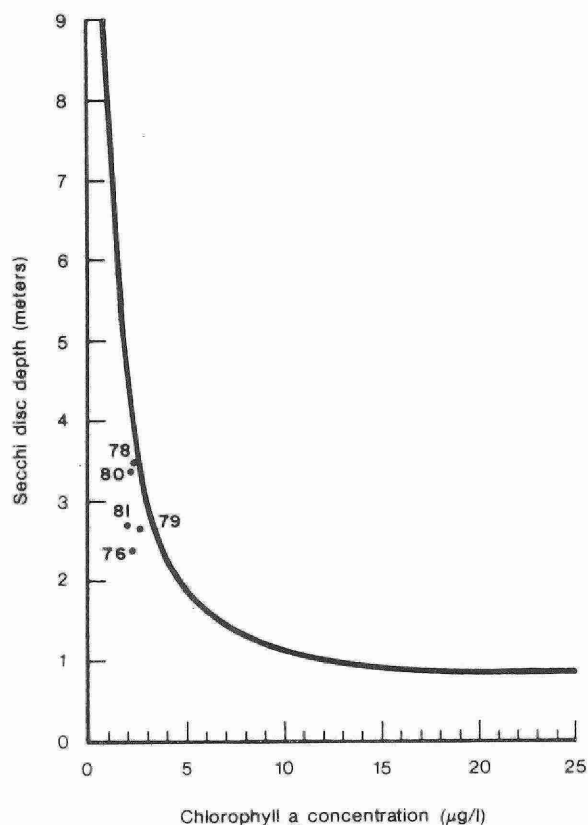
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.015	0.845	0.004	0.345	8.47	--	--
B	0.03	0.39	0.007	0.06	7.91		
1978 T	0.03	0.320	0.002	0.04		204	2.5
B	0.05	0.363	0.004	0.08	--	196	2.3
1979 T	0.011	0.33	0.002	0.02	8.52	176	5.0
B	0.030	0.30	0.003	0.12	7.81	181	<5.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	150.5	--	0.03	--	--	--
B	156.0		0.04			
1978 T	--	0.55	0.02	32.5	0.4	19.4
B		0.55	0.04	36.3	0.5	20.7
1979 T	150		0.03	30.9	0.5	21.6
B	160	--	0.07	36.3	0.6	21.5

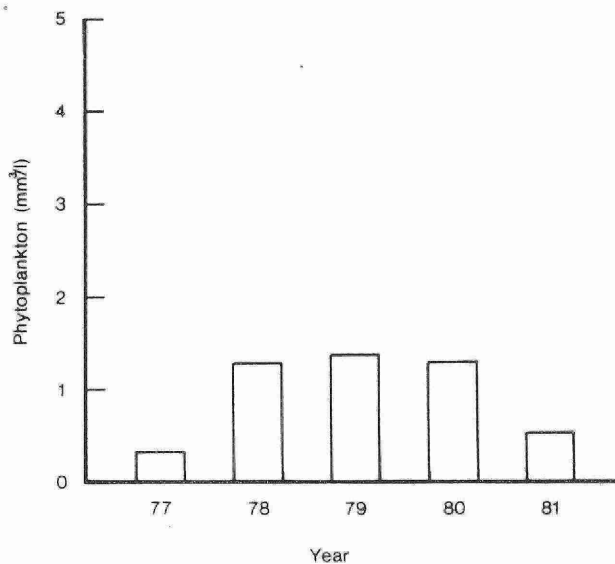
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

15. GOULD LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

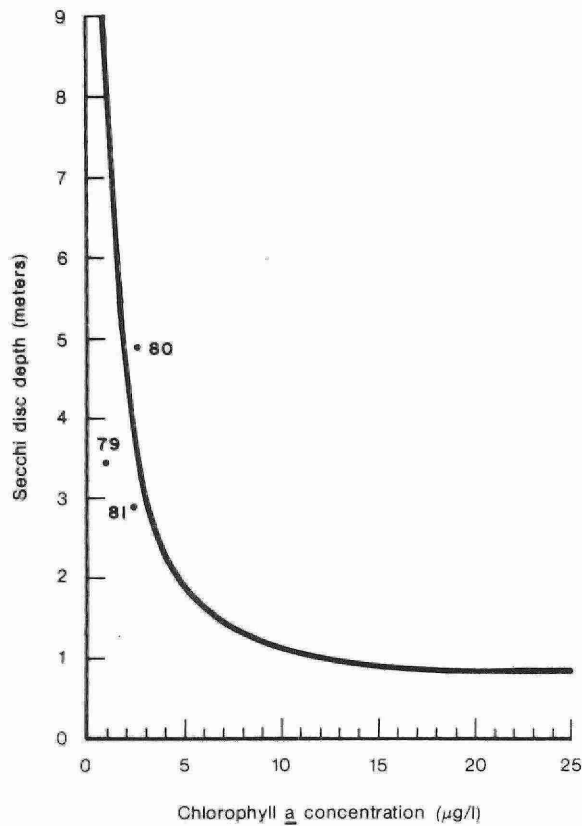
Average values for water quality parameters

Average values for water quality parameters									
		Secchi	Chlorophyll		Phytoplankton	Phosphorus		Chloride	Hardness
Year		disc (m)	a (ug/l)		volume (mm ³ /l)	Total	Soluble	as Cl	as CaCO ₃
1977	T	3.0	--		0.391	0.012	0.002	5.47	152
	B					0.014	0.002	5.43	154.5
1978	T	3.3	2.2		1.368	0.014	0.001	4.8	134.5
	B					0.021	0.002	5.0	137.7
1979	T	2.7	2.8		1.405	0.012	0.003	4.8	149
	B					0.010	0.001	4.8	157
Nitrogens									
Year		Free ammonia	Kjeldahl	Nitrite	Nitrate	pH (no units)		Total	Solids Suspended
1977	T	0.030	0.569	0.001	0.021	8.42		--	--
	B	0.060	0.621	0.001	0.021	8.21			
1978	T	0.030	0.468	0.002	0.04	--		164	2.5
	B	0.125	0.627	0.004	0.03			169	1.5
1979	T	0.037	0.51	0.001	0.01	8.42		177	4.7
	B	0.078	0.51	0.001	0.01	8.10		179	4.6
Alkalinity									
Year		as CaCO ₃	Turbidity FTU**		Iron	Calcium	Sodium	Magnesium	
1977	T	133.7	--		0.035	--	--		
	B	138.5			0.035				
1978	T	--	1.0		0.19	36.0	2.1		16.5
	B		1.2		0.09	38.7	2.4		16.4
1979	T	133	--		0.04	32.1	2.2		16.9
	B	140			0.06	34.9	2.1		17.1

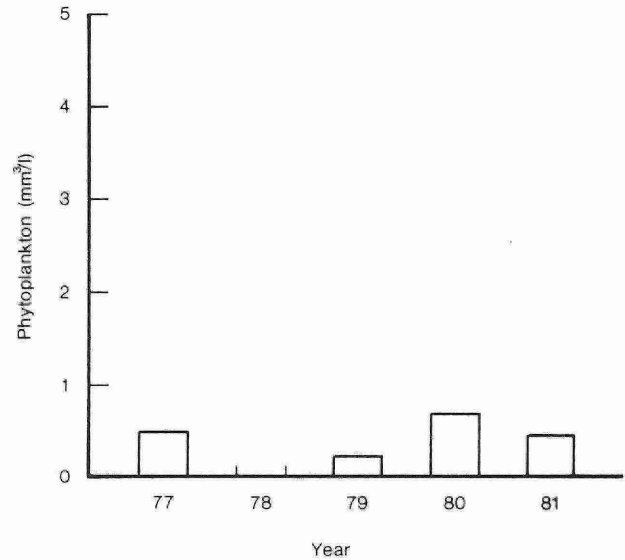
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

16. IRISH LAKE



Chlorophyll a-Secchi disc curve.



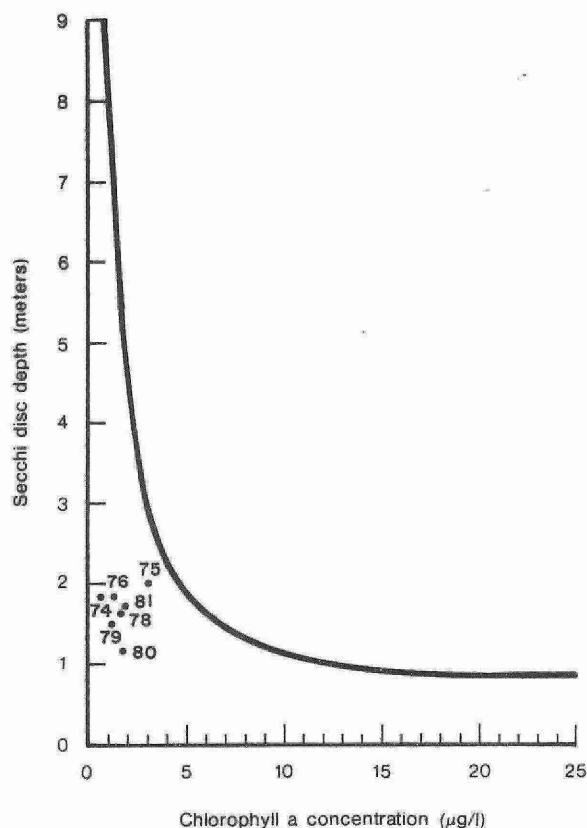
Phytoplankton cell volumes.

Average values for water quality parameters

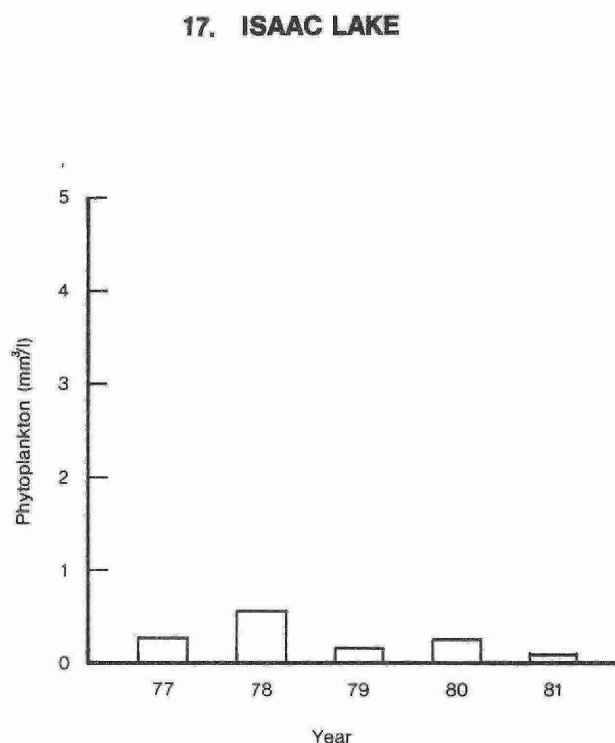
Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	4.6	--	0.631	0.013	0.003	1.0	92
B				0.013	0.004	1.0	100
1978 T	--	--	--	--	--	--	--
B							
1979 T	3.4	1.6	0.381	0.013	0.003	1.2	95
B				0.014	0.001	1.1	93
Nitrogens							
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	pH (no units)	Total Solids	Suspended
1977 T	0.315	0.905	0.005	0.08	8.13	--	--
B	0.340	0.785	0.006	0.08	7.94		
1978 T	--	--	--	--	--	--	--
B							
1979 T	0.024	0.45	0.001	0.02	8.58	112	<5.0
B	0.033	0.50	0.001	0.01	8.59	114	<5.0
Alkalinity as CaCO ₃							
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	87.4	--	0.08				
B	86.2		0.30				
1978 T	--	--	--	--	--	--	--
B							
1979 T	85.5	--	0.05	21.8	0.73	9.8	
B	85.9		0.07	21.4	0.47	9.6	

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

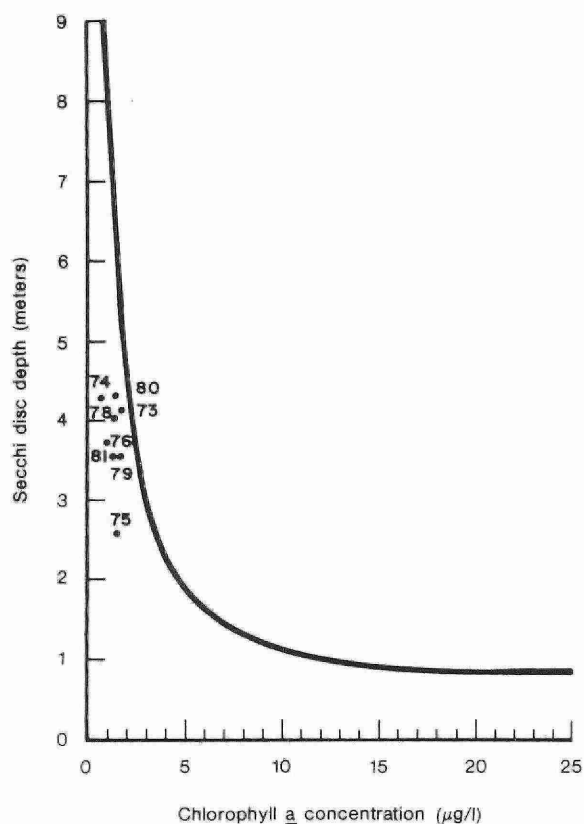
Average values for water quality parameters

Average values for water quality parameters							
	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm ³ /l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
Year				Total	Soluble		
1977	1.5	--	0.309	0.021	0.006	3.0	152
1978	1.7	1.7	0.574	0.01	0.001	2.9	161
1979	1.5	1.4	0.230	0.012	0.001	3.0	170
	Nitrogens				pH	Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	0.045	0.495	0.005	< 0.01	8.09	--	--
1978	0.031	0.525	0.002	0.01	8.36	186	2.5
1979	0.020	0.530	0.001	0.01	8.34	189	5.0
	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	129	--	0.06	--	--	--	
1978	151	1.04	0.05	38.2	1.1	15.8	
1979	154	--	0.08	36.9	1.5	18.9	

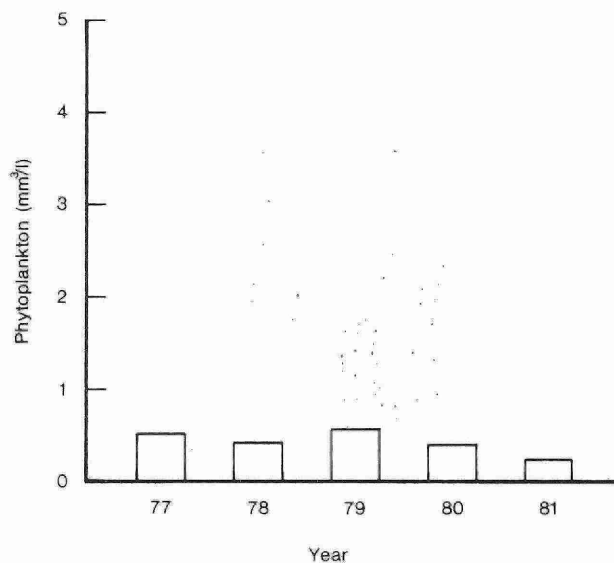
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

18. McCULLOUGH LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (µg/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	3.7	—	0.501	0.008	0.001	3.6	231.3
B				0.016	0.002	3.9	221.3
1978 T	4.0	1.3	0.487	0.006	0.001	3.4	231
B				0.009	0.002	3.9	235
1979 T	3.6	1.8	0.542	0.005	0.002	3.6	238
B				0.008	0.003	3.6	231

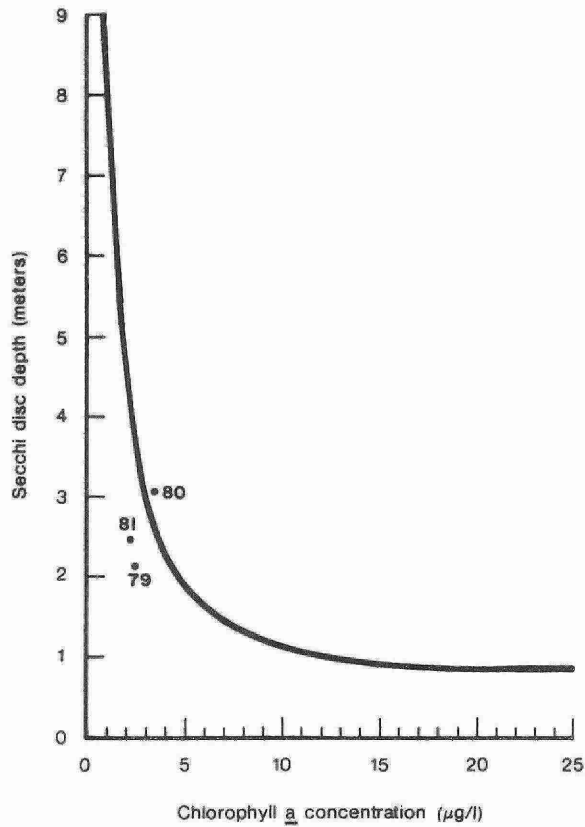
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.019	0.318	0.004	0.40	8.38	—	—
B	0.028	0.352	0.035	0.55	7.83		
1978 T	0.021	0.279	0.004	0.47	8.33	260	0.7
B	0.021	0.294	0.004	0.68	8.41		
1979 T	0.016	0.26	0.003	0.53	8.38	249	4.5
B	0.020	0.26	0.009	0.63	7.72	254	4.7

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	218.3	—	0.038	—	—	—
B	210.8	—	0.080			
1978 T	215	1.18	0.056	52.7	1.93	24.1
B	215	1.67	0.09	55.0	2.03	23.8
1979 T	224	—	0.04	53.4	2.0	25.4
B	214	—	0.13	54.2	2.0	23.1

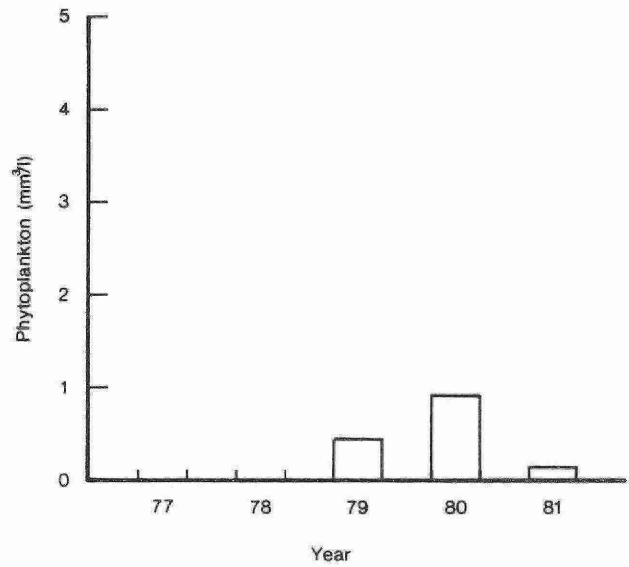
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

19. MCGILL LAKE



Chlorophyll a-Secchi disc curve.



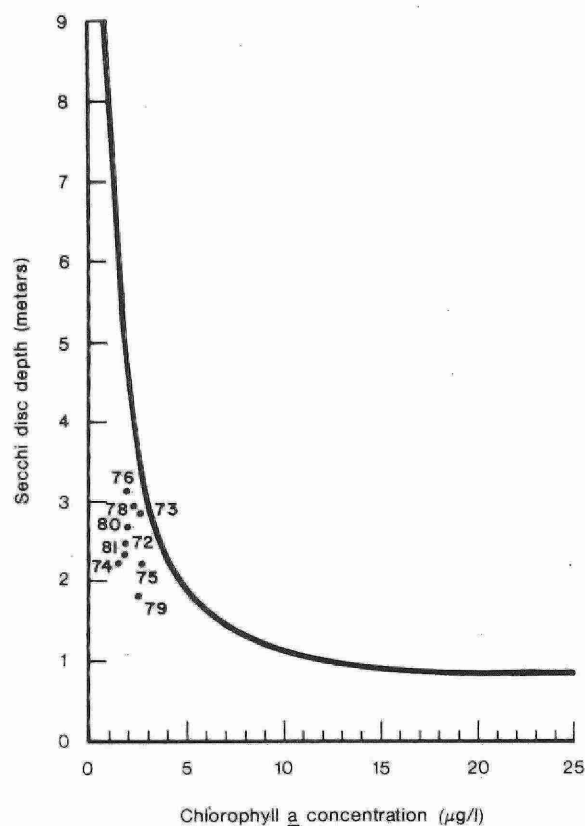
Phytoplankton cell volumes.

Average values for water quality parameters

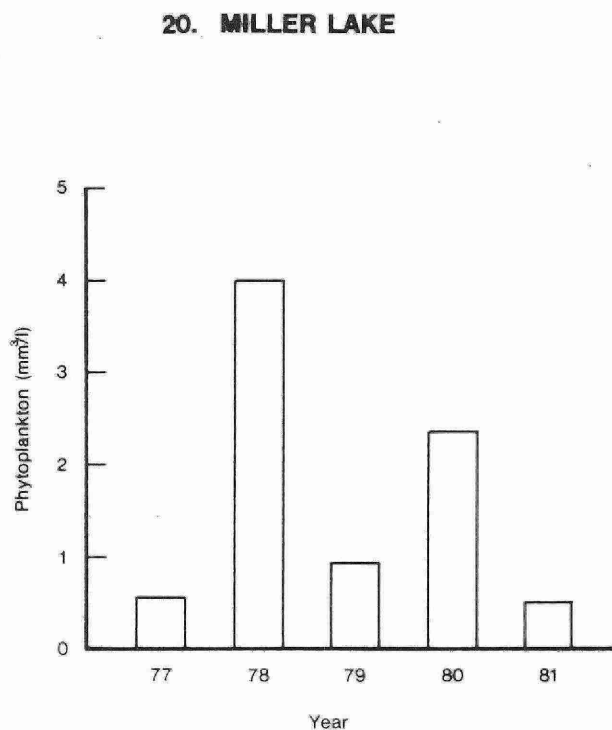
Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1979 T	2.1	2.7	.378	0.014	10.001	1.5	199
B	--	--	--	0.029	0.005	2.0	196
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1979 T	0.013	0.39	10.001	10.01	8.34	236	15.0
B	0.052	0.50	0.001	10.01	7.76	227	15.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	--	--	--	--	--	--	
B	--	--	--	--	--	--	
1978 T	--	--	--	--	--	--	
B	--	--	--	--	--	--	
1979 T	188	--	0.04	47.5	1.1	19.7	
B	184	--	0.08	47.2	1.4	18.9	

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



Chlorophyll a-Secchi disc curve.



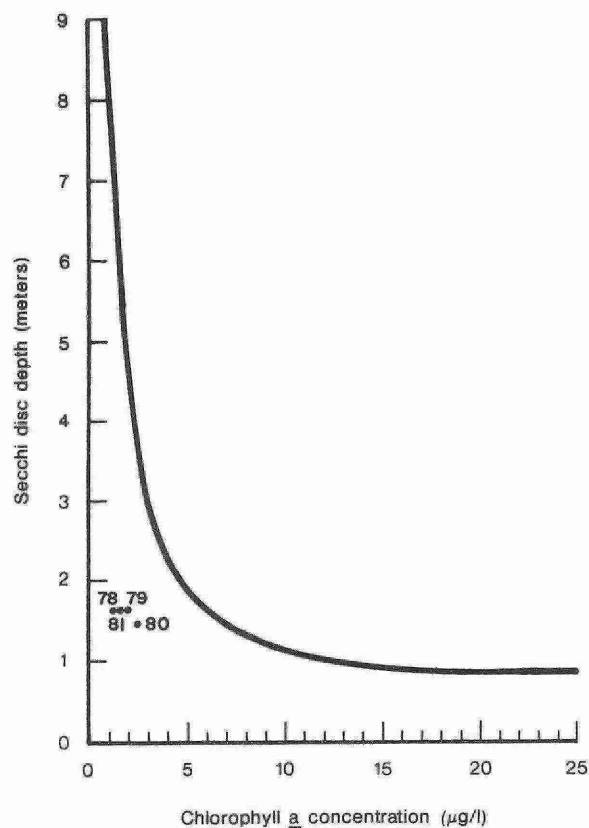
Phytoplankton cell volumes.

Average values for water quality parameters

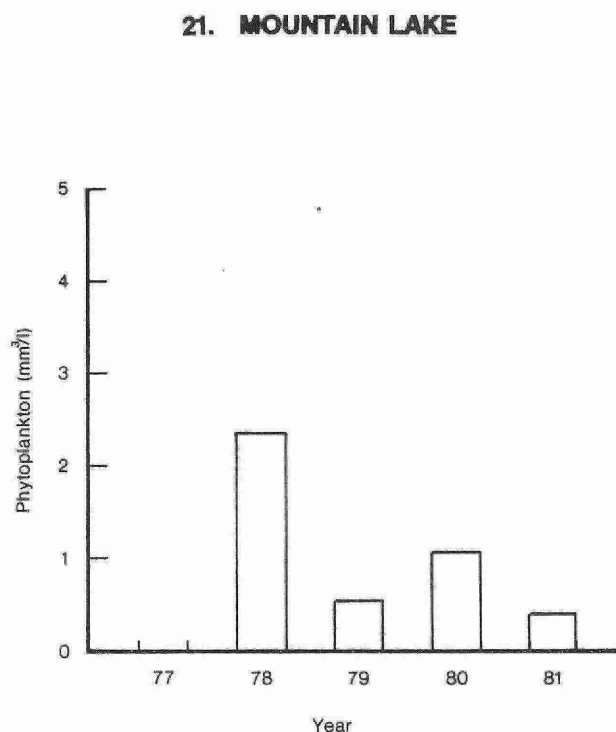
		Secchi	Chlorophyll	Phytoplankton	Phosphorus		Chloride	Hardness
Year		disc (m)	a (ug/l)	volume (mm ³ /l)	Total	Soluble	as Cl	as CaCO ₃
1977	T	2.6	--	0.592	0.010	0.003	1.28	155
	B				0.013	0.002	1.28	155
1978	T	2.9	2.3	4.153	0.006	0.001	1.6	192
	B				0.010	0.001	1.7	209
1979	T	1.8	2.5	1.066	0.010	0.002	1.4	165
	B				0.008	0.001	1.5	167
				Nitrogens		pH	Solids	
Year		Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	T	0.023	0.481	0.001	0.022	8.43	--	--
	B	0.035	0.530	0.001	0.019	8.43		
1978	T	0.024	0.400	0.003	0.06	8.60	178	1.8
	B	0.028	0.432	0.003	0.08	8.58		
1979	T	0.024	0.50	0.001	0.01	8.40	178	< 5.0
	B	0.021	0.42	0.001	0.01	8.41	180	< 5.0
		Alkalinity	Turbidity					
Year		as CaCO ₃	FTU**	Iron	Calcium	Sodium	Magnesium	
1977	T	140		0.038				
	B	141	--	0.054	--	--	--	
1978	T	149	1.20	0.04	90.6	8.4	36.9	
	B	148	0.94	0.05	103.0	9.9	42.0	
1979	T	150		0.03	34.8	0.6	19.0	
	B	151	--	0.13	35.1	0.6	19.2	

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

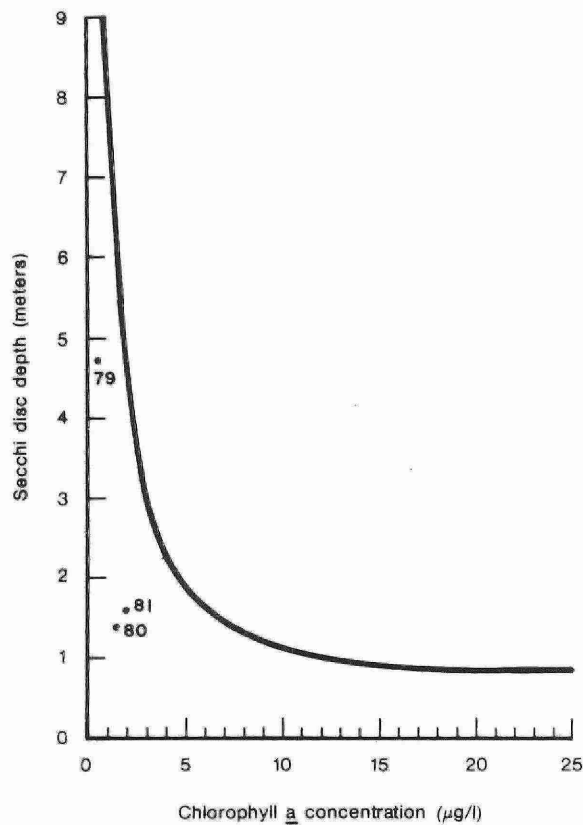
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a ($\mu\text{g/l}$)	Phytoplankton volume (mm^3/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO_3
1977	--	--	--	--	--	--	--
1978	1.7	1.4	2.471	0.010	0.002	2.2	168
1979	1.7	1.9	0.567	0.018	< 0.001	2.3	158
Nitrogens					pH (no units)	Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	--	--	--	--	--	--	--
1978	0.038	0.574	0.003	0.04	8.41	177	4.2
1979	0.036	0.69	0.001	0.01	8.69	177	< 5.0
Year	Alkalinity as CaCO_3	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	--	--	--	--	--	--	
1978	156	1.14	0.04	39.5	0.95	16.8	
1979	137	--	0.06	27.8	1.4	21.5	

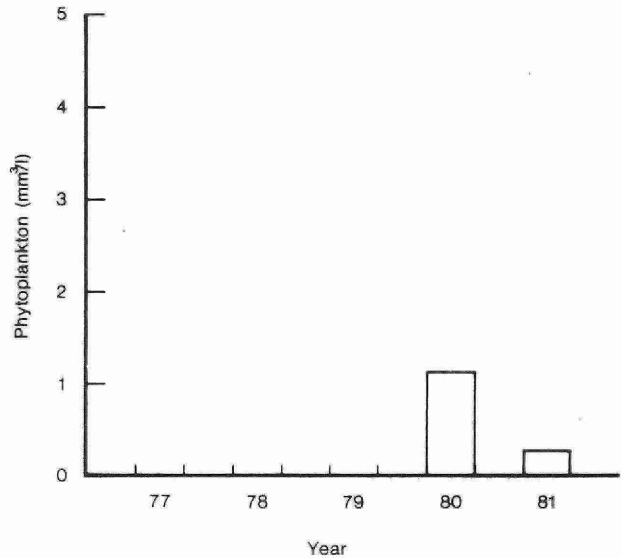
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

22. SHEPHARD LAKE



Chlorophyll a-Secchi disc curve.



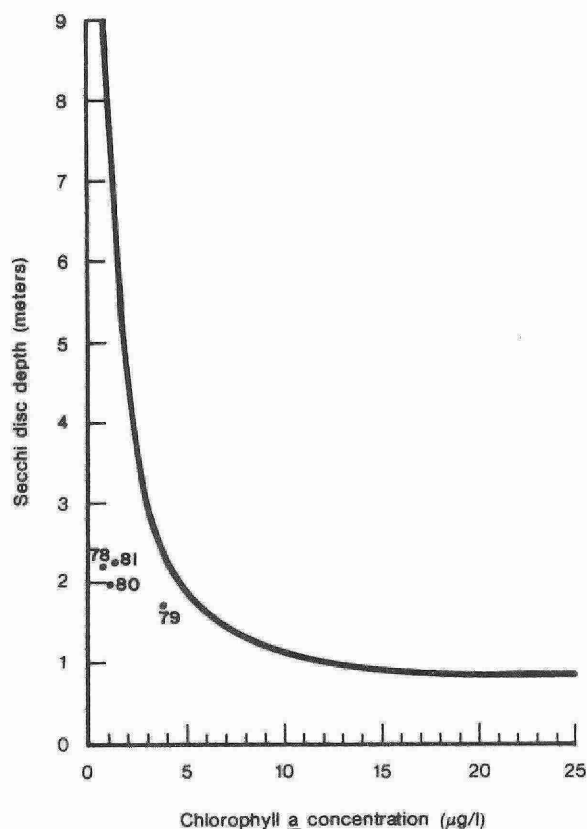
Phytoplankton cell volumes.

Average values for water quality parameters

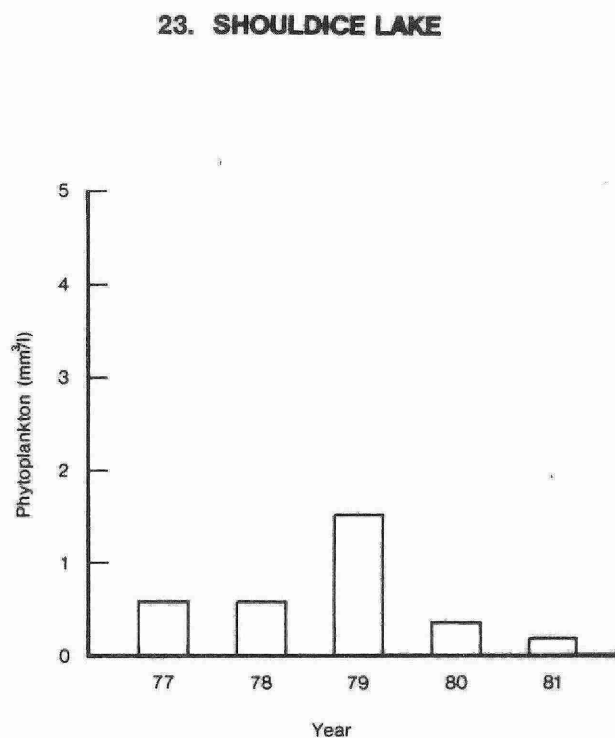
Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1979 T	4.8	0.7	--	0.007	0.001	1.5	213
B				0.005	0.001	1.5	200
Nitrogens				pH		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1978 T	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--
1979 T	0.063	0.43	0.002	0.25	8.15	245	15.0
B	0.090	0.58	0.002	0.11	8.26	246	15.0
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977 T	--	--	--	--	--	--	
B	--	--	--	--	--	--	
1978 T	--	--	--	--	--	--	
B	--	--	--	--	--	--	
1979 T	195	--	0.02	42.8	1.3	25.7	
B	181	--	0.06	35.0	1.2	27.2	

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977	4.0	--	0.681	0.013	0.003	1.0	142
1978	2.2	0.9	0.681	0.008	0.002	0.7	160
1979	1.7	4.1	1.687	0.008	0.002	1.0	152

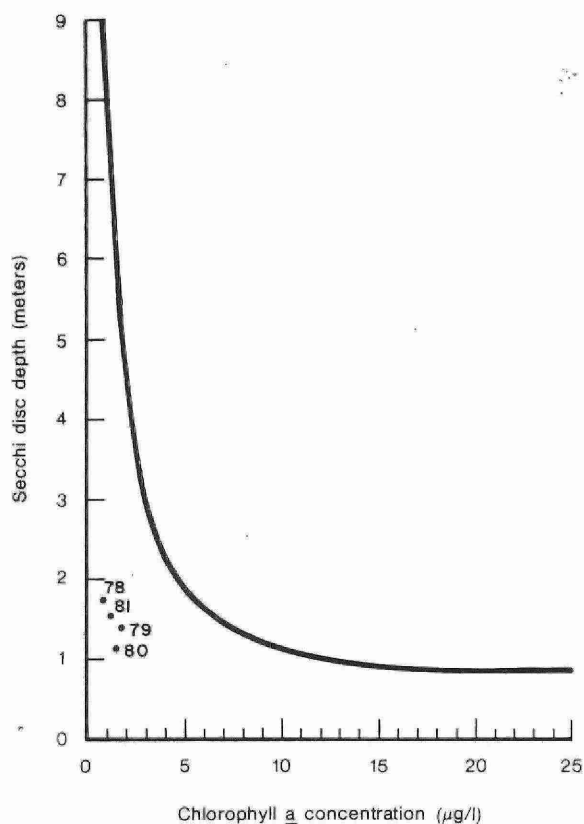
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	0.018	0.583	0.002	0.01	8.7	--	--
1978	0.055	0.490	0.002	0.02	--	192	28.5
1979	0.022	0.560	0.001	0.01	8.53	170	< 5.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977	130.5	--	0.025	--	--	--
1978	--	0.85	0.02	31.0	0.4	19.7
1979	138	--	0.06	24.1	0.5	22.3

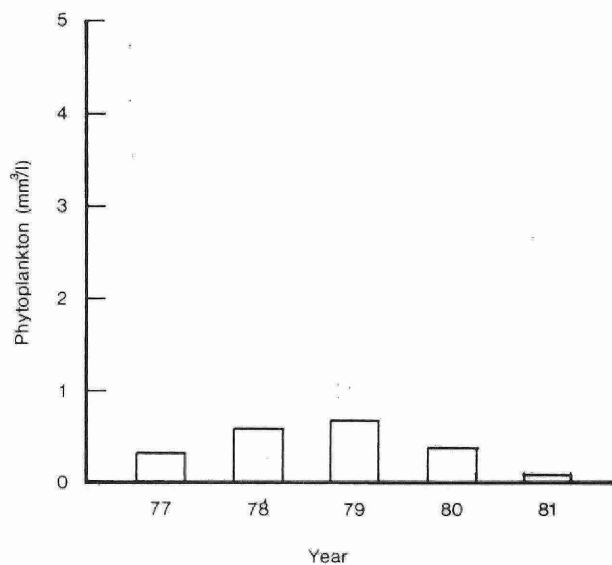
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

24. SILVER LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

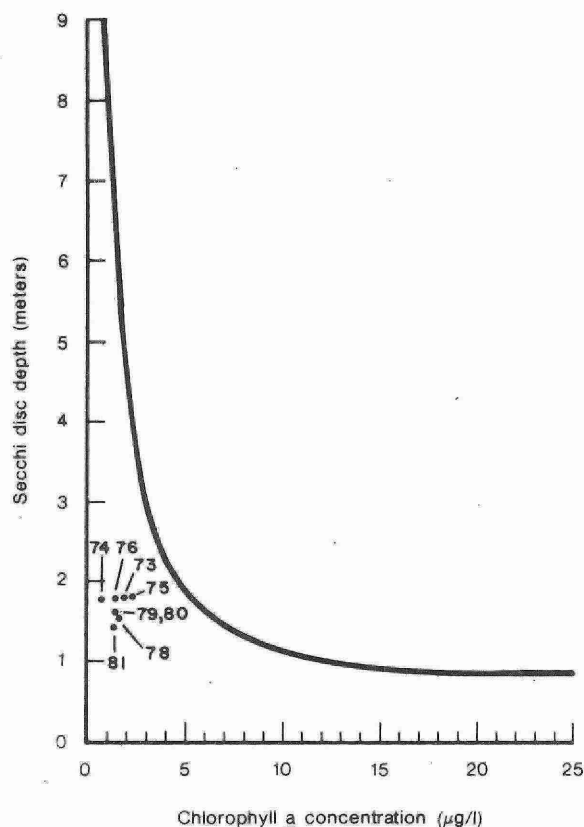
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus		Chloride as Cl	Hardness as CaCO ₃
				Total	Soluble		
1977	--	--	0.265	0.016	< 0.001	2.0	--
1978	1.7	1.2	0.632	0.014	0.002	2.0	164
1979	1.5	1.9	0.725	0.013	0.001	2.4	168
Year	Nitrogens				pH	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	0.025	0.585	0.001	< 0.01	--	--	--
1978	0.04	0.554	0.002	< 0.01	8.36	194	2.0
1979	0.041	0.620	0.001	0.01	8.38	191	5.5
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	135	--	0.09	--	--	--	
1978	164	1.19	0.13	41.3	0.8	15.0	
1979	142	--	0.08	38.0	1.1	17.7	

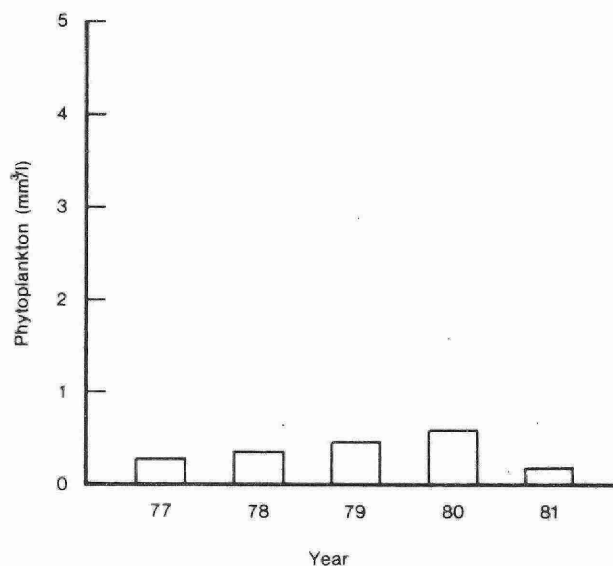
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

25. SKY LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

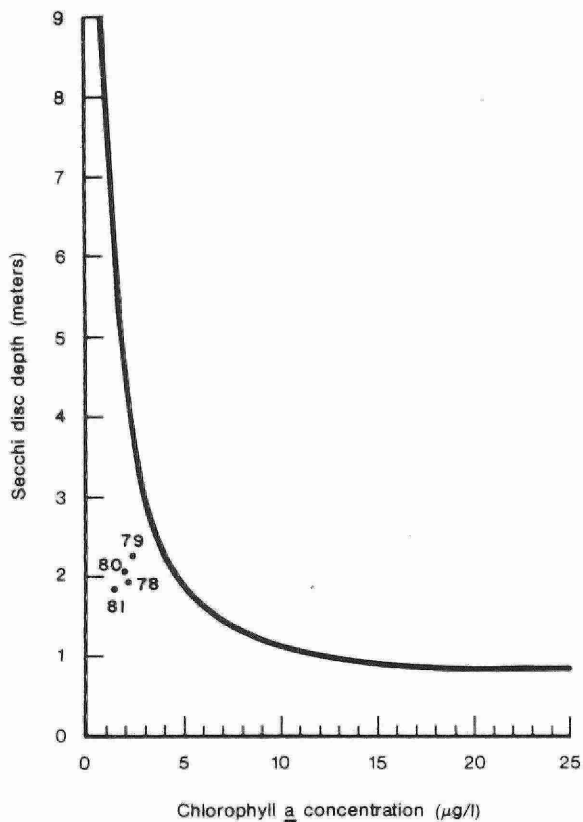
Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a ($\mu\text{g/l}$)	Phytoplankton volume (mm^3/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO_3
1977	0.9	--	0.285	0.014	0.002	2.6	162
1978	1.7	1.9	0.459	0.016	0.006	2.3	163
1979	1.7	1.8	0.519	0.024	0.001	2.8	169
Nitrogens				pH		Solids	
Year	Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	0.025	0.625	0.001	0.01	8.47	--	--
1978	0.024	0.495	0.002	< 0.01	8.38	186	1.5
1979	0.016	0.59	0.001	< 0.01	8.54	213	5.0
Year	Alkalinity as CaCO_3	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium	
1977	147.9	--	0.067	--	--	--	
1978	156	1.31	0.07	37.7	1.1	16.8	
1979	158	--	0.07	33.4	1.8	20.8	

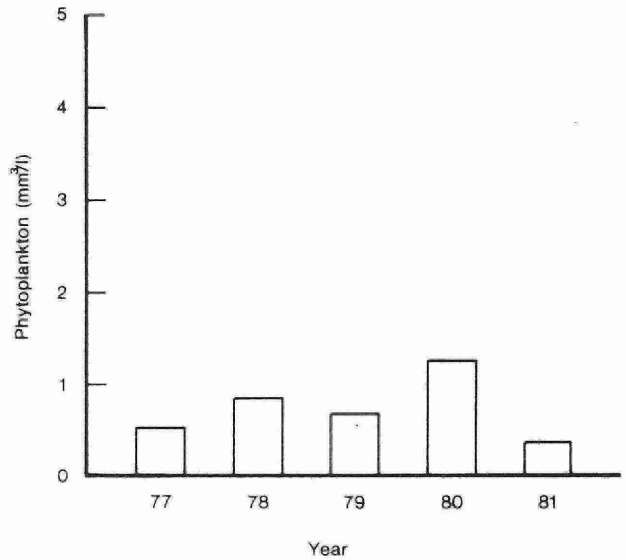
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

26. SPRY LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

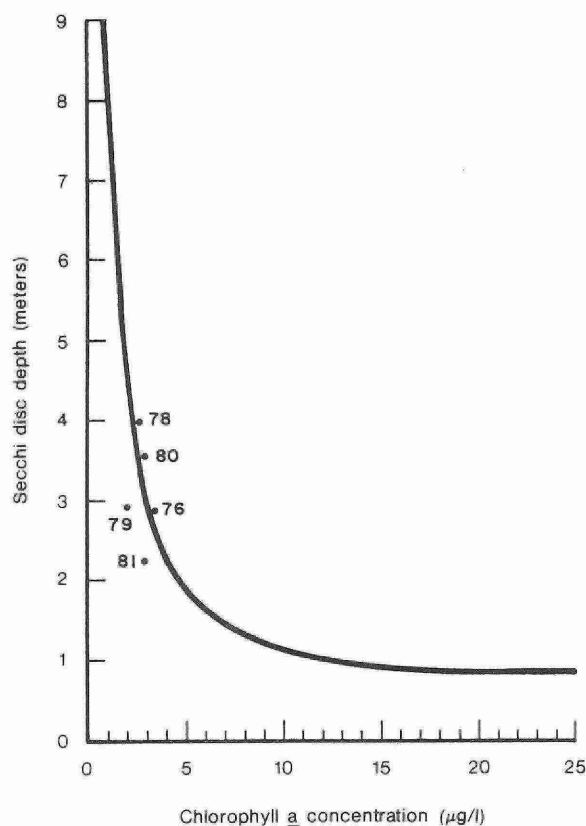
Year	Secchi disc (m)	Chlorophyll a (µg/l)	Phytoplankton volume (mm³/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977	1.2	--	0.620	0.014	0.003	4.73	110
1978	1.8	1.45	0.939	0.011	0.001	4.7	106
1979	2.4	2.5	0.695	0.009	0.001	5.1	120

Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977	0.086	0.76	0.002	0.02	8.45	--	--
1978	0.139	0.79	0.003	0.04	9.0	134	2
1979	0.034	0.61	0.001	0.01	8.50	145	< 5.0

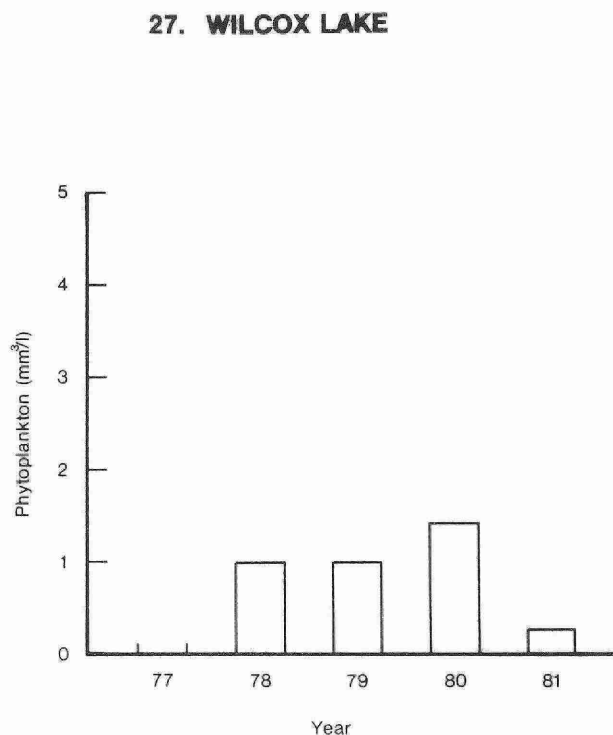
Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977	99	--	0.05	--	--	--
1978	88	1.27	0.07	29.8	2.2	8.8
1979	100	--	0.08	30.6	2.7	10.6

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year	Secchi disc (m)	Chlorophyll a (ug/l)	Phytoplankton volume (mm³/l)	Phosphorus Total	Phosphorus Soluble	Chloride as Cl	Hardness as CaCO ₃
1977 T	3.6	--	--	0.017	0.005	8.0	180
B				0.018	0.005	6.0	184
1978 T	4.0	2.9	1.073	0.012	0.002	4.9	183
B				0.015	0.002	4.9	180
1979 T	2.9	2.3	1.120	0.011	0.001	4.8	205
B				0.016	0.002	4.9	211

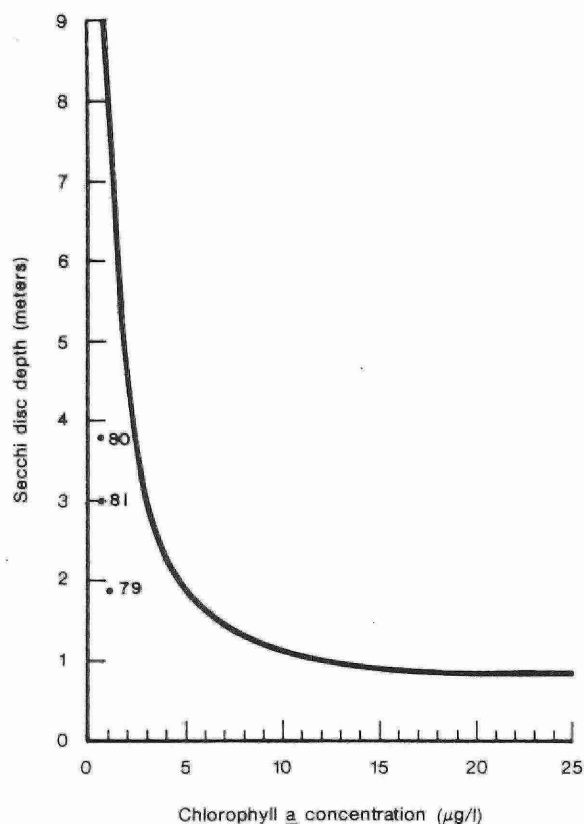
Year	Nitrogens				pH (no units)	Solids	
	Free ammonia	Kjeldahl	Nitrite	Nitrate		Total	Suspended
1977 T	0.025	0.365	0.005	0.10	8.17	--	--
B	0.025	0.425	0.007	0.12	8.16	--	--
1978 T	0.018	0.40	0.001	0.01	8.48	--	--
B	0.018	0.426	0.002	0.01	8.49	--	--
1979 T	0.023	0.37	0.001	0.01	8.48	219	<5.0
B	0.021	0.42	0.001	0.01	8.45	218	<5.0

Year	Alkalinity as CaCO ₃	Turbidity FTU**	Iron	Calcium	Sodium	Magnesium
1977 T	166	--	0.08	--	--	--
B	170		0.06			
1978 T	180	0.92	0.04	40.5	--	19.8
B	180	1.10	0.04	40.5		19.2
1979 T	181	--	0.05	45.3	3.1	20.4
B	181		0.09	44.3	3.3	21.2

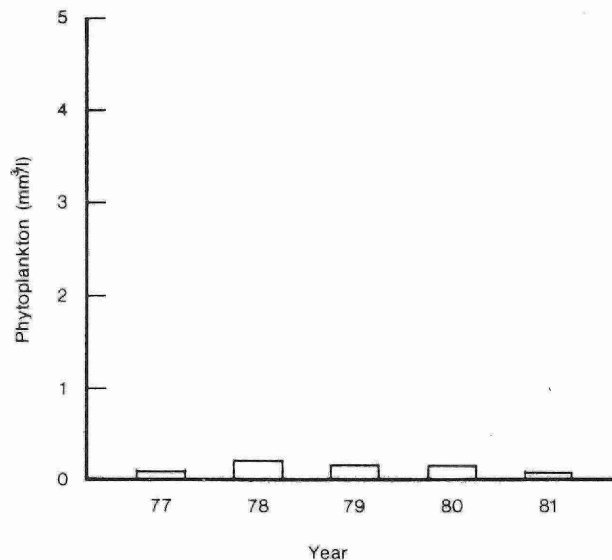
*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units

28. WILLIAMS LAKE



Chlorophyll a-Secchi disc curve.



Phytoplankton cell volumes.

Average values for water quality parameters

Year		Secchi	Chlorophyll	Phytoplankton	Phosphorus		Chloride	Hardness
		disc (m)	a (ug/l)	volume (mm³/l)	Total	Soluble	as Cl	as CaCO ₃
1977	T	2.1	--	0.075	0.006	0.001	14	216
	B				0.016	0.002	14	214
1978	T	--	--	0.226	--	--	--	--
	B							
1979	T	1.9	1.1	0.140	0.004	0.001	12.8	208
	B				0.007	0.001	12.8	212
Nitrogens					pH		Solids	
Year		Free ammonia	Kjeldahl	Nitrite	Nitrate	(no units)	Total	Suspended
1977	T	0.075	0.42	0.007	0.31	8.28	--	--
	B	0.07	0.46	0.006	0.31	8.22	--	--
1978	T	--	--	--	--	--	--	--
	B							
1979	T	0.048	0.32	0.003	0.17	8.31	253	< 5.0
	B	0.050	0.34	0.003	0.16	8.34	246	< 5.0
Alkalinity		Turbidity						
Year		as CaCO ₃	FTU**	Iron	Calcium	Sodium	Magnesium	
1977	T	200	--	0.033	--	--	--	
	B	201		0.063				
1978	T	--	--	--	--	--	--	
	B							
1979	T	189	--	0.04	44.8	7.1	23.2	
	B	190		0.05	45.3	7.4	23.9	

*Note - All values in mg/l except where otherwise indicated

**Formazin Turbidity Units



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